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Contents

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EDWARD L. GREENE AND HOWELL'S "FLORA OF NORTHWEST AMERICA"

ERWIN F. LANGE

Numerous writers have referred to the fact that Thomas J. Howell, pioneer Oregon botanist, published the first flora of the Northwest under very difficult circumstances by himself setting all of the type by hand and having his friend, Martin Gorman, read the proofs. A fact which no writer has referred to is that without the help of Edward L. Greene the book would probably never have been completed. Only one writer, Alice Eastwood (Erythea 6:58–60. 1898), in writing a review of the second fascicle of Howell's Flora refers to the style of nomenclature as that centering around Greene. The correspondence of Thomas Howell to Edward L. Greene reveals an interesting story of determination on the part of the pioneer botanist, destitute and with but three months of formal schooling, to complete a badly needed flora for the only great section of the country not treated by such a work.

The first reference to his book occurred early in April, 1892, when Howell wrote to Greene: "I have been very busy writing my Flora of Oregon, Washington, and Idaho of which I enclose a specimen page. I hope to have it published about the first of January next."

The specimen page seems to have caused a quick critical reply from Greene for later in the month (both dates are difficult to read), Howell wrote:

> Thank you for your criticism of my work but it should have been stated in a former letter that it is not yet being printed. The sheet I sent you was set up from an unrevised copy and was merely intended to base calculations as to the number of pages and cost of publishing, and was not submitted to an expert proofreader for correction. It will all have to be set over agane, and I will say here there will be no bad spelling or punctuation in it. . . . The other corrections are such as any expert proofreader would notice. Not more than a half dozen sheets of this has been distributed, so they will not do much harm.

On December 12, 1892 he wrote Greene that his financial troubles "by which I will probably loose all my savings has run me nearly crazy for the past eight months."

The next letter referring to the book was dated April 24, 1896, in which Howell mentioned that except for the slowness of the printers the whole of Part I would have been ready for distribution. The following month, May 6, 1896, he wrote:

> Nothing would please me more than have you pass upon every page of my proposed Flora before it goes to press. Can you point out the way this can be done. Or can you show me how it can get published at all? There is no one here that can do the work except under my direct supervision and then they want double price for doing it, and want their pay in advance and this I am unable to meet for I have been reduced to poverty by some unfortunate investments.

MADROÑO, Vol 13, No. 1, pp. 1–48, Feb. 4, 1955.

As to the pages already printed they will probably never be distributed in their present form, for the parties that undertook to do the printing have just gone back on their contract, and refuse to do any more of it on any terms that I can meet. This leaves me on the verge of despair for the manuscript that I have represents ten years of the best part of my life, and to loose it now looks to me like throwing away life itself.

Howell mentioned in the same letter that he was going to try to get the American Book Company to publish it but was afraid he would have to alter the book too much to be satisfactory. He sent Greene some printed pages of the book and commented on the many errors in printing.

Greene wrote immediately to Howell and offered financial help of which Howell seemed very appreciative and wrote at length concerning his present experience and the prospects of his flora. He told Greene that 28 pages had been printed when the publisher gave up the contract (no reason was given but it is believed the printer was unable to read Howell's poor handwriting of technical terms and set the copy correctly). Howell estimated that to continue the book as the sample pages would require from 600 to 700 pages and could be published with less capital by getting out parts of about 100 pages each. He promised Greene all the proceeds from the sales and liberal pay for his services if he could work out any way to publish the book.

In letters of June 11, and September 14, 1896, he thanked Greene for his offer to help with the book and promised that Greene's wishes would be strictly adhered to. Howell reported that it would be impossible to have the American Book Company publish the Flora. The American Book Company agreed to invest $1,000 in the book if Howell could invest $2,000 for the preparation of the "Electraplates" but being unable to secure that amount the situation seemed hopeless. If Howell could raise the $2,000 the American Book Company contemplated printing 2000 copies which would bring $3,200. With the book company taking out the first $1,000 and then half of the remainder there would be nothing left for Howell. In conclusion Howell wrote, "You once made me a proposition to loan me a few hundred dollars to publish the book with, will you let me know how much you can let me have for the purpose and on what terms."

A week later, September 21, 1896, Greene answered Howell's letter raising a number of questions. To these Howell replied October 1, 1896:

I see you still have the impression that I intend to have *illustrations* in my proposed book, which I wish to assure you *is not the case* for I never had any intention of *illustrations* at all; the *plates* spoken of are *Book plates* that is *electroplates* of the text and *not illustration plates.*

There are two ways of making a smaller book of it. One is to *condense the descriptions* and thereby make them worthless. The other is to leave out a large part of the species and make an incomplete work.

There are about 3500 species of plants in the territory that I propose to cover, and nine tenths of them grow in Oregon, so you see that it will not reduce the book much to reduce the territory. I have made a careful estimate and find that I can have

1000 copies of 600 pages published here for $1,000. I can do this so cheap because I have a pretty fair printing outfit of my own and I have orders on hand now to assure the sale of 1000 copies in less than two years at $2.50 per copy.

With $500 I could get the book out next spring, but I have no way of getting that amount now, and I would not think of letting you put one dollar into this book that you do not feel certain that you will get it back agane with interest.

In a letter to Greene dated October 13, 1896, Howell again assured him that the book would sell readily and that he did not immediately need $500 but could get started on $50 or $100. He guaranteed Greene that every page would be sent him for criticism before going to press and would be printed with his own type. With the letter he sent 28 pages of proof sheets for correction.

His proof sheets were imperfect and drew some criticism from Greene but in reply Howell wrote November 26, 1896, "I am very thankful for your notes and criticisms and shall profit by them to the fullest extent."

On December 21, 1896, Howell again suggested getting the book out in parts in order to get it published with less capital. Since he was held up 16 days waiting for his proofs to arrive from Greene, he suggested sending his manuscript for criticism and correction so that the work would proceed faster. Pages of manuscript and proof were sent and more were mailed on December 26, 1896.

That Greene was very critical of the manuscript is evident from Howell's reply of January 11, 1897:

Your letter with the Mss. was received yesterday, and to say that I am surprised at what you say is stating it mildly; for I certainly do not deserve the harsh things that you say about me. You seem to forget that most of my copy was written some seven years ago and was made up different from what this is, for a year ago I went over it and made it conform with Mr. Robinson's work, not because I particularly liked it but because as a whole I liked it a little better than the way I had it. But you seme to think that I must know what you are doing in advance of its publication, for I had not read Pittonia when I sent you the copy and certainly could not have known what was in it, as my letter of a day or two later will show. Now if you had went at the copy good naturally and just changed names when you thought they were incorrect you would have saved yourself much trouble. . . . I do not feel disposed to quarrel with you, but you will remember that my library is very small and that I live many hundred miles from any good one, and therefore work at a great disadvantage.

Other references to the difficulties in completing the book were:

January 16, 1897

I have been getting along very slow with the work, but have now got to where I can go faster and will have the first 100 pages ready to issue about the first of February. I am also entirely out of money.

January 31, 1897

Your note of the 23d inst. with Draft for 70 dollars is at hand and I enclose note for the two as you requested.

If I stated that I would have 100 pages out the first of February it was a mistake it should have been the first of March.

February 25, 1897

With this I send you another 16 pages of the book and I have a good start on the next 16 making 112 in all. With that I shal have a few hundred coppies bound and put on the market, and I expect a little revenue from it. . . .

I shall send you manuscript in a few days for critical examination to avoid making any more blunders. I expected some money of my own to come in by this time to meet maturing bills, but it has not yet arrived, and I fear now it will not very soon and I am gitting nearly broke agane.

March 11, 1897

Your letter the 5th inst, with Draft was received today. I had March 10th printed on my title page, but on account of delay at the bindry I have been unable to send out part I yet, but will do so in a day or two. I wish now that I had made the date March 15th.

March 20, 1897

I have been unwell lately and unable to do much and am but little better now.

I will soon begin setting the type for another part which I hope to have ready early in May.

May 29, 1897

Your letter with the draft for $40 was received a short time ago. I am extremely sorry that I was unable to return it at once, but I had run some bills that I had to pay, and I had no other means of paying them now, so I had to use it.

Only a few scattered letters between 1898 and 1904 have been preserved and these contain but few references to the publication of Howell's Flora.

April 16, 1902

Mr. Gorman informs me that you lack fascicle 4 of my Flora so I send you it to you under separate cover.

October 22, 1902

I am drove nearly to death at the present trying to make a living and get my Flora done at the same time.

While the preceding excerpts of Howell's letters reveal the tremendous hardships under which the first Flora of the Northwest was published, the account is not complete. The Howell-Greene correspondence also contains numerous references to problems relating to the identification, determination and naming of plants to be included in the book. It is not the purpose of this paper to include such material.

Howell's Flora was completed in 1903 after seven separate fascicles were bound and distributed. Howell reported to Eva Emory Dye, Oregon historical writer, that a thousand copies were printed but only three hundred were bound. An unknown additional number were bound after Howell's death late in 1912.

The writer is indebted to Albert L. Delisle, curator of the Greene-Nieuwland Herbarium of the University of Notre Dame, for making available the Howell-Greene correspondence.

Portland State Extension Center,
Oregon State System of Higher Education.

REVISION OF THE DIOECIOUS AMARANTHS[1]

JONATHAN SAUER

In the great genus *Amaranthus*[2], the relatively small number of dioecious species, including those formerly assigned to other genera which are here united with *Amaranthus,* form a fairly distinct and coherent group. In contrast to the monoecious amaranths, which are represented by endemic and pandemic species in every continent, all the dioecious amaranths are natives of a single continent, North America, and none has migrated very far from its original home. An endemic Peruvian species (*A. Haughtii* Standl. Field Mus. Bot. Ser. 11:149. 1936) is described as dioecious, but examination of the type and all other available collections shows it is actually monoecious.

The dioecious habit, which is extremely constant, is the only morphological character distinguishing this group as a whole from all the monoecious amaranths. However, all the dioecious species share a combination of characters which occurs in only a small minority of the monoecious species, namely pentamerous staminate flowers together with complex terminal inflorescences, often called spikes in the literature but technically thyrses. It is conceivable, although by no means certain, that the group is a natural one, in the sense of having a single origin with subsequent speciation independent of the rest of the genus. Be that as it may, no formal section or sections for the dioecious species are proposed here. Considering the lack of any widely accepted subdivisions of other parts of the genus, formal infra-generic disposition of the dioecious species does not appear urgent or useful at the present time.

Hybridization is given little attention in this paper, although it is a common and widespread source of variation in the group. In fact it was natural "intergeneric" *Amaranthus* × *Acnida* hybrids that first attracted my attention to this group; the revision was initiated primarily because clearer understanding of the species involved was prerequisite to understanding of the hybrids. The study of individual variants in the mongrel populations, which is still in progress, is being handled as a separate problem. The present paper has the limited objective of characterizing the basic entities in the group.

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[1] This investigation was aided by a grant from the Wisconsin Alumni Research Foundation. Publication cost of extra pages beyond the usual MADROÑO limit was borne by the author.

[2] The English text of the International Code of Botanical Nomenclature (Lanjouw et al., 1952, p. 44) states that *Amarantus* is the original spelling, in contradiction to the French text (p. 193) and the facts. In the same volume (p. 101), *Amarantus* is proposed for conservation over *Amaranthus,* while Amaranthaceae (with *Amaranthus* as the type genus) is included in the *nomina familiarum conservanda* (p. 66).

Systematic Changes

The taxonomic treatment presented here differs considerably from Standley's (1917), the only other modern treatment of the group. There are ten species in place of Standley's sixteen and all are now assigned to *Amaranthus,* rather than being divided among three genera: *Amaranthus, Acnida,* and *Acanthochiton.* Discussions of the revised species definitions are given below in the sections on individual species, but some explanation should now be made of the revised generic grouping.

Acanthochiton is a monotypic taxon that was originally described (Torrey, 1853, p. 170) under the curious belief that it was a new genus of the Chenopodiaceae, where it could hardly have been included in any other genus. Torrey himself suggested that it might better be assigned to the Amaranthaceae, where later workers have invariably placed it. The peculiar bracts provide the one clear-cut character distinguishing this taxon from *Amaranthus.* This difference, although conspicuous, is only quantitative and seems no more fundamental than the modification of bracts to spines in the monoecious *Amaranthus spinosus,* for which a separate genus has never been found necessary. Moreover, the peculiar bracts develop only on the pistillate plants, while the staminate plants are within the range of variation of *Amaranthus* species in all morphological characters. The affinity of *Acanthochiton* to certain species of *Amaranthus* is so obvious that I believe it has been left as a distinct genus only because the plants are rather rare and have attracted little attention. Addition of this taxon to *Amaranthus* requires no change in the usual definition of the genus.

Acnida, like *Amaranthus,* appeared in Linnaeus' "Species Plantarum" of 1753 long before most of the North American amaranth species were discovered. *Acnida* originally included a single species, *A. cannabina,* which differed from all of Linnaeus' *Amaranthus* species not only in various quantitative characters but also in two clear-cut qualitative characters: dioecious habit and pistillate flowers with no perianth. Subsequently, as more and more species became known, this discontinuity gradually blurred. Separation of the genera on the basis of dioecious or monoecious habit was abandoned when new dioecious species were discovered and assigned to *Amaranthus* because of the conspicuous perianths of their pistillate flowers. Absence of this perianth has become the sole criterion for separating *Acnida* from *Amaranthus;* no comparable key character was applicable to the staminate plants. This single remaining criterion is largely a fiction: the presence of a pistillate perianth in certain *Acnida* species was reported nearly sixty years ago (Uline and Bray, 1895, p. 156) but the fact has generally been ignored or glossed over in later literature. Pistillate tepals are truly absent in some species assigned to *Acnida;* in some they are very small and irregularly present, so that they might be dismissed as mere rudiments, but in other species they are well-developed and constantly present. Although this perianth may consist of

only one or two tepals, the same is true of some monoecious *Amaranthus* species. In short the two "genera" can be separated only by using intricate character combinations rather than by a clear-cut dichotomy. Moreover, they are not easy to distinguish subjectively on the basis of general aspect.

The absence of a clear-cut morphological discontinuity is accompanied by the absence of an absolute reproductive barrier. The existence of natural *Acnida* × *Amaranthus* hybrids has already been mentioned. This evidence is reinforced by a magnificent series of experimental crosses between certain species of *Acnida* and *Amaranthus* (Murray, 1940). These hybrids are highly sterile, but no more so than some of Murray's crosses between two species of *Amaranthus*.

The balance of the evidence seems to show that the affinity between *Acnida* and *Amaranthus* is too great to justify maintaining them as separate genera, and the two are here united. Although neither name has priority, *Amaranthus* has had far more general currency and is the obvious choice for the enlarged group. This union requires that *Amaranthus* be described as having 0 to 5 tepals in the pistillate flowers, rather than 1 to 5 as formerly. Otherwise no change is required in the usual circumscription of the group.

Notes on Maps and Citations

All specimens cited and mapped have been assigned to species primarily on the basis of microscopic flower characters. The great majority of specimens show the constantly repeating morphological patterns characteristic of pure species; these specimens were annotated with the usual type of label and the localities were plotted on the maps as dots. A respectable minority of the specimens are individual variants, presumably the result of crossing between dioecious species. As is so often the case in hybrid populations found in nature, exact intermediates between the two parental species are rare; an individual usually has a preponderance of traits of one or the other species. These atypical plants were assigned to the species which they resemble most closely, annotated with special labels indicating their probable hybrid origin, and plotted on the maps with crosses. In cases where both typical and atypical specimens are known from the same locality the cross symbol is omitted, so that the total occurrence of atypical plants is somewhat greater than the maps indicate. No attempt is made to separate typical and atypical specimens in the citations since both are commonly included in a single collection.

A certain class of dioecious specimens has been annotated but excluded from maps and citations. These are highly sterile plants, probably mostly F_1 hybrids between monoecious and dioecious species, which cannot properly be assigned to any one species.

In the citations, names printed in upper case under each country refer to civil divisions of two ranks: the state, province, or department at the start of each paragraph, followed by subdivisions such as county, parish, or *municipio*. An asterisk preceding the name of a country or division

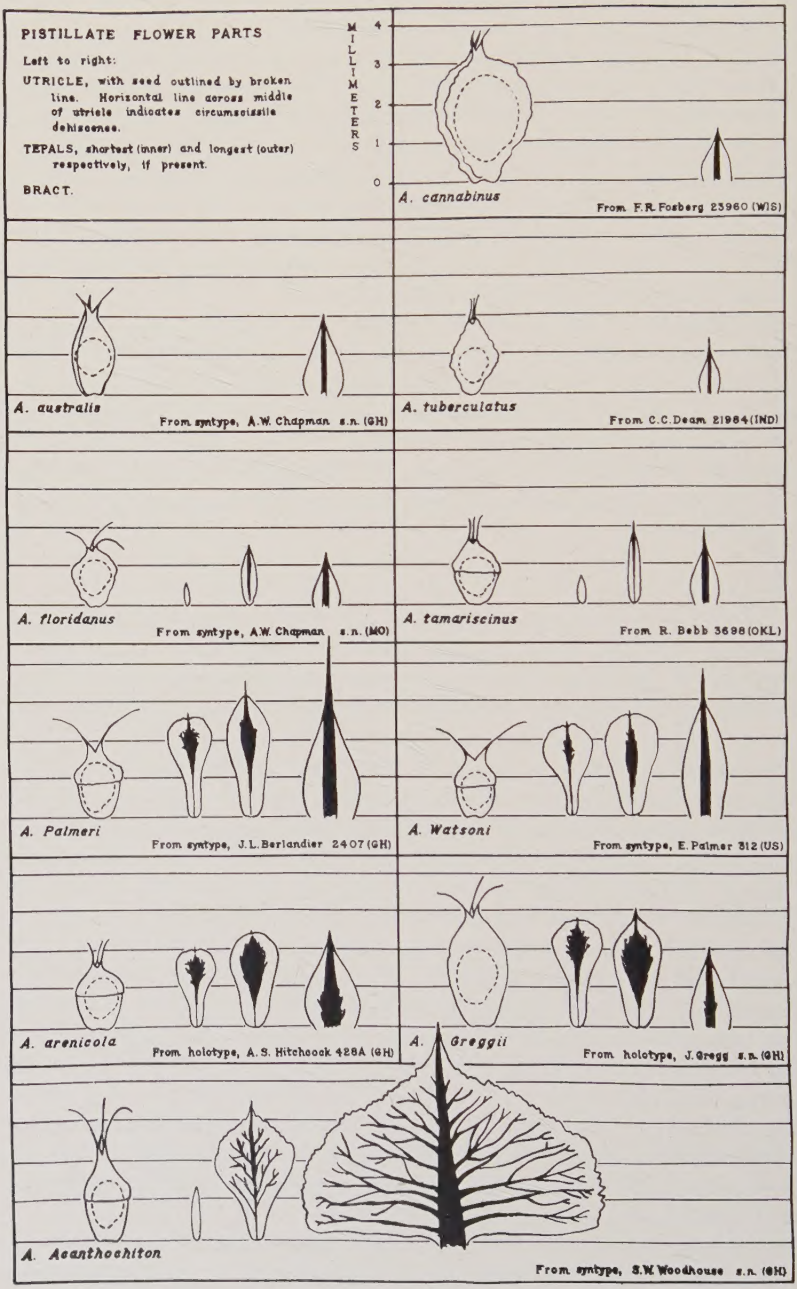

FIG. 1. Pistillate flower parts of the ten dioecious species of *Amaranthus*.

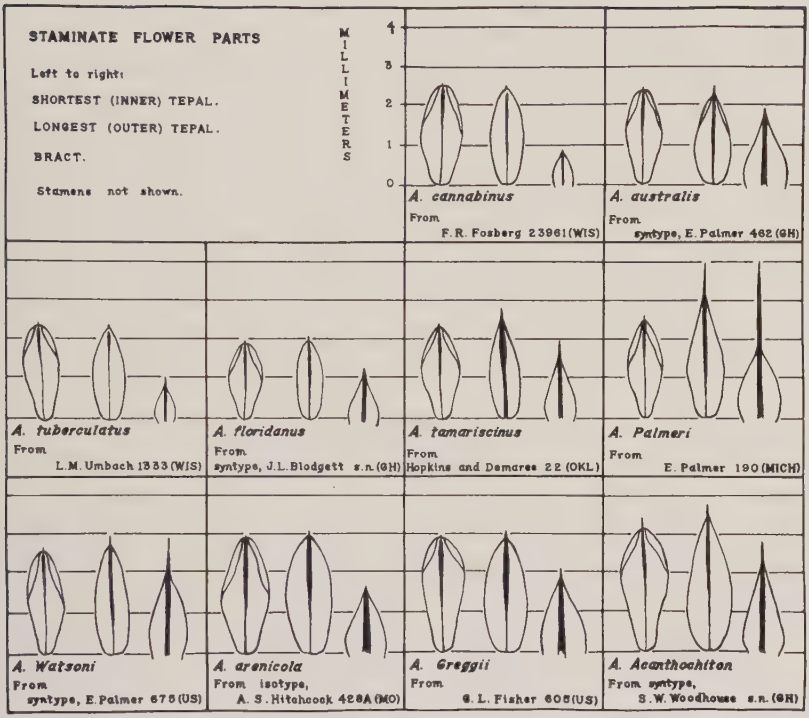

FIG. 2. Staminate flower parts of the ten dioecious species of *Amaranthus*.

indicates that it is outside the area covered by the map. The year given in parentheses after each major civil division name is the collection date of the oldest specimen seen from the region. Collections are listed only by collector, number (if given), and herbaria, abbreviated according to the scheme of Lanjouw and Stafleu (1954).

Collections from the herbaria at the following institutions are cited: California Academy of Sciences, Carnegie Museum, Cornell University, Duke University, Gray Herbarium of Harvard University, Herbier Marie-Victorin de l'Université de Montréal, Indiana University, Iowa State College, Kansas State College, Michigan State College, Missouri Botanical Garden, Museum of Northern Arizona at Flagstaff (cited as FLAG), New Mexico College of Agriculture and Mechanic Arts, North Dakota Agricultural College, Oberlin College, Ohio State University, Pomona College, Rocky Mountain Herbarium of the University of Wyoming, Smithsonian Institution, South Dakota State College, Southern Methodist University, State University of Iowa, Sul Ross State College, Tulane University, University of Arizona, University of Arkansas, University of California at Berkeley, University of Cincinnati, University of Colorado, University of Florida Agricultural Experiment Station, University of Illinois, University of Michigan, University of Minnesota, University of Nebraska, Univer-

sity of North Carolina, University of Oklahoma, University of Tennessee, University of Texas, University of Wisconsin, Utah State Agricultural College, West Virginia University.

Keys to the Species

The key to pistillate plants is the more reliable one, since most of the diagnostic characters are concentrated in the mature pistillate flowers. Flowering staminate plants can be identified with reasonable accuracy but recognition depends in part on familiarity with slight differences in aspect which cannot be adequately described in a key. In dealing with any of these plants it must be remembered that the frequency of hybridization in the group makes identifications based solely on a key even less trustworthy than usual.

Pistillate Plants

A. Lamina of bract narrow, entire, scarious, not enfolding flower; leaf margin smooth.
  B. Tepals completely lacking or irregularly present and rudimentary (less than 1 mm. long and without visible midveins).
    C. Seed 2 to 3 mm. long; utricle 2½ to 4 mm. long; leaf-blade usually narrowly lanceolate to linear . . . . . 1. *A. cannabinus*
    CC. Seed about 1 mm. long; utricle not exceeding 2 mm. in length; leaf-blade usually broadly lanceolate.
      D. Utricle with conspicuous, regular longitudinal ridges; bract more than 1½ mm. long with stout midrib not far excurrent beyond lamina. . . . . 2. *A. australis*
      DD. Utricle smooth or irregularly tuberculate; bract less than 1½ mm. long with slender excurrent midrib . . . . . 3. *A. tuberculatus*
  BB. Tepals regularly present and well developed (at least 1 mm. long and with distinct midveins).
    C. Tepals 1 or 2, lanceolate to linear.
      D. Utricle indehiscent; leaf-blade usually linear . . . 4. *A. floridanus*
      DD. Utricle circumscissile; leaf-blade usually oblong or lanceolate . . . . . 5. *A. tamariscinus*
    CC. Tepals 5, at least the inner ones spatulate.
      D. Utricle circumscissile, about 1½ mm. long; leaf-blade membranaceous.
        E. Longest (outer) tepal acute or acuminate with midvein excurrent into rigid point; bract and outer tepals conspicuously longer than inner tepals . . . . . 6. *A. Palmeri*
        EE. Tepals all obtuse or retuse, the midveins excurrent slightly or not at all; bract and outer tepals scarcely exceeding inner tepals.
          F. Bract with moderately heavy midrib, excurrent far beyond lamina; style branches usually 2 . . . . . 7. *A. Watsoni*
          FF. Bract with extremely heavy midrib, not excurrent far beyond lamina; style branches usually 3 . . . . . 8. *A. arenicola*
      DD. Utricle indehiscent, about 3 mm. long; leaf-blade coriaceous. . . . . 9. *A Greggii*
AA. Lamina of bract extremely broad, crenate, foliaceous, enfolding and concealing flower; leaf margin crispate . . . . . 10. *A. Acanthochiton*

Staminate Plants

A. Outer tepals without heavy midveins and not appreciably longer than the inner; bracts mostly with slender midribs, not over 2 mm. long.
  B. Bract less than 1 mm. long, the midrib scarcely excurrent. 1. *A. cannabinus*

BB. Bract more than 1 mm. long or, if slightly shorter, the midrib conspicuously excurrent.
C. Leaf-blade usually lanceolate, more than 1 cm. wide; inflorescence often with several branch thyrses not subtended by leaves.
D. Bract with moderately heavy midrib; outer tepals with excurrent midveins . . . . . 2. *A. australis*
DD. Bract with slender midrib; midveins of outer tepals not excurrent . . . . . 3. *A. tuberculatus*
CC. Leaf-blade usually linear, less than 1 cm. wide; inflorescence unbranched above leaves . . . . . 4. *A. floridanus*
AA. Outer tepals with heavy midveins, often definitely longer than the inner; bracts with heavy midribs, mostly over 2 mm. long.
B. Outer tepals acuminate, the midveins excurrent as rigid spines.
C. Bract about 2 mm. long, definitely shorter than outer tepals 5. *A. tamariscinus*
CC. Bract about 4 mm. long, usually equalling outer tepals . 6. *A. Palmeri*
BB. Outer tepals acute or obtuse, apiculate, but the dark midveins not excurrent.
C. Bract equalling tepals, often conspicuously pubescent . . 7. *A. Watsoni*
CC. Bract shorter than tepals, glabrous.
D. Leaf margin smooth.
E. Leaf-blade membranaceous . . . . . 8. *A. arenicola*
EE. Leaf-blade coriaceous . . . . . 9. *A. Greggii*
DD. Leaf margin crispate . . . . . 10. *A. Acanthochiton*

1. **Amaranthus cannabinus** (L.) comb. nov. *Acnida cannabina* L. Sp. Pl. 2:1027. 1753. *A. rusocarpa* Michx. Fl. Bor. Am. 2:234. 1803. *A. ruscocarpa* Willd. Sp. Pl. 4:768. 1805. *Amaranthus macrocaulos* Poir. in Lam. Encyc. Suppl. 1:314. 1810. *Acnida salicifolia* Raf. Am. Mo. Mag. 2:43. 1817. *A. rhyssocarpa* Spreng. Syst. 3:903. 1826. *A. obtusifolia* Raf. New Fl. 1:54. 1836. *A. Ellioti* Raf. loc. cit. 54. 1836. *A. cannabina* L. [var.] α *lanceolata* Moq. in DC. Prodr. 13(2):277, 1849. *A. cannabina* L. [var.] γ *salicifolia* (Raf.) Moq. loc. cit. 278. 1849.

The Linnaean species was based on an older taxon (*Cannabis foliis simplicibus* Gronov. Fl. Virg. 192. 1739. Type: *J. Clayton* no. *599,* Virginia, salt marshes, abundant in August). The description and place of collection make its identity reasonably certain. Michaux distinguished his species from that of Linnaeus by slight differences in leaf and utricle shape; he specified no type or locality but published a recognizable drawing of the plant. During the nineteenth century various authors attempted to maintain a distinction between *Acnida cannabina* and *A. rusocarpa* (the latter often being given one of the "corrected" spellings suggested by Willdenow and Sprengel). This attempt was finally abandoned after Uline and Bray (1895, p. 155) pointed out, correctly I believe, that "*A. cannabina* and *A. ruscocarpa* are not distinct. We find here a complete series of intergradations, while the difference of age actually accounts for more than the difference called for in their original descriptions." *Amaranthus macrocaulos* was first published with a completely inadequate description, but Moquin-Tandon re-examined the type (*J. Bosc s.n.,* Carolina), citing Poiret's species as a synonym of his own variety *lanceolata,* based on the same specimen. From Moquin-Tandon's description and the place of collection, it is fairly certain that Bosc's specimen should be assigned to *A.*

cannabinus, although the material may represent one of the southern colonies which show traces of introgression from *A. australis. Acnida salicifolia* was described from plants growing on the seashore and in marshes and ditches in Long Island and New Jersey; no specimens are cited. The localities, together with Rafinesque's statement that the species is intermediate between *A. cannabina* and *A. rusocarpa,* indicate that he was dealing with plants which were at the most minor variants of *Amaranthus cannabinus.* Rafinesque presented *Acnida obtusifolia* as a substitute name for the taxon which everyone had been calling *A. cannabina,* stating that Linnaeus had described that species as having compound leaves and was therefore dealing with an entirely different plant. This curious idea has no known basis; Linnaeus' original description specifically stated that the species has simple leaves. *Acnida Ellioti* was described as growing on the banks of streams in Carolina and Florida. No specimens are cited, but the locations and the incomplete description suggest that this name, like *Amaranthus macrocaulos* was called forth by contact with some of the atypical plants which occur toward the southern margin of the range of *A. cannabinus.*

Plants stout, erect, usually 1 to 3 m. tall with ascending branches; leaf-blade narrowly lanceolate to linear, faintly resembling a willow or hemp leaf (whence some of the scientific names and the common name of "water-hemp"), flowering and fruiting entirely during summer and fall, mainly July to late October; thyrses flexible, usually 5 to 10 cm. long, the glomerules often few-flowered and widely-spaced, in the ♂ plants leafless branch thyrses often numerous and the uppermost ones often not subtended by leaves, the ♀ thyrses either entirely terminal on leafy branches or, if a few branch thyrses present, each subtended by a leaf; bract with midrib scarcely excurrent, the ♂ bract about 1 mm. long, midrib very slender, the ♀ bract about 1½ mm. long, midrib moderately heavy; ♂ flowers with 5 stamens, the 5 tepals approximately equal, 2½ to 3 mm. long, the inner emarginate, the outer acute, the midveins not excurrent; ♀ flowers usually without perianth, rarely with 1 or 2 irregular, rudimentary tepals; utricle 2½ to 4 mm. long, indehiscent, fleshy, with 3 to 5 prominent longitudinal ridges corresponding to the 3 to 5 style branches, often rugose and black when mature; seed 2 to 3 mm. in diameter, often obovoid, flattened with depressed endosperm, dark reddish brown.

The species is almost entirely confined to the margin of tidewater in a zone where the surface is covered by salty, brackish, or fresh water at high tide. Almost every collection bears some such notation as: coastal marsh, brackish marsh, salt marsh, salt meadow, tide flats, edge of slough, bank of estuary, tidal riverbank. The plants are most common in sandy places but are also reported in mud and muck. A collection from a millpond in Delaware was the only one seen from an inland site. If the species has weedy tendencies, they are slight; there is one collection from wet, peaty clearings in the pinewoods along the Virginia coast and another from a railroad yard by the tidal Delaware River at Camden.

UNITED STATES. CONNECTICUT (1859). FAIRFIELD: *E. R. Drew* KSC, MO, UC; *E. H. Eames* GH, ILL, MIN, US, WIS. MIDDLESEX: *Anonymous* GH, MO; *H. L. Jones* OC. NEW HAVEN: *E. H. Eames* ILL; *D. C. Eaton* WIS; *G. R. Kleeberger* CAS; *A. B. Seymour* DUKE; *R. H. Ward* ILL. NEW LONDON: *K. P. Jansson* COLO, MT, RM; *W. A. Setchell* UC.

DELAWARE (1861). KENT: *N. Hotchkiss 4765,* US; *E. L. Larsen 711,* DUKE, GH, US, WIS, *734* GH, *762* MO, US, *770* MO. NEWCASTLE: *W. M. Canby* POM, WIS; *J. R. Churchill* GH, MO, WIS; *E. L. Larsen 665* MO; *I. Tidestrom 11529* GH.

DISTRICT OF COLUMBIA (1877). *F. Blanchard* MO, WIS; *E. S. Steele* MIN, NEB, OC, WIS; *G. Vasey* MSC; *L. F. Ward* GH, MO, NEB, US.

FLORIDA (1880). Indefinite locality: *W. W. Calkins* ILL; *A. H. Curtiss* NCU. DUVAL: *A. H. Curtiss 2379* CM, CU, FLAS, GH, MIN, NEB, US, *5117* ILL, MO, US.

GEORGIA (1902). CAMDEN: *R. M. Harper 1556* GH, MO, MSC, NEB, US; *Wiegand & Manning 1131* CU, GH. MCINTOSH: *Thorne & Norris 6231* CU.

MAINE (1916): CUMBERLAND: *Fernald, Long, & Norton 13581* GH, MT. YORK: *A. E. Perkins* GH; *R. H. True 1086* MIN.

MARYLAND (1887). ANNE ARUNDEL: *H. H. Bartlett 1837* MICH; *W. C. Muenscher 3711* CU, *3712* CU; *J. W. Roller 754* TENN; *J. Schneck* ILL. CALVERT: *A. S. Hitchcock* ILL. CECIL: *W. M. Benner 6165* GH. CHARLES: *H. O'Neill* MT. PRINCE GEORGES: *F. Blanchard* MO. SAINT MARY'S: *J. E. Benedict, Jr.* UARK; *E. P. Killip 32194* MICH, POM, UC. TALBOT: *E. C. Earle 1283* WVA, *2265* CU; *F. Shreve 176* ARIZ.

MASSACHUSETTS (1856). BARNSTABLE: *J. M. Fogg, Jr. 3706* CU, MO; *C. H. Knowlton* MO; *C. Pickering* GH; *W. P. Rich* GH, MIN; *E. F. Williams* GH. ESSEX: *N. C. Fassett 16029* WIS; *J. H. Sears* DUKE, GH; *E. F. Williams* GH. MIDDLESEX: *Anonymous* GH; *W. J. Beal* MSC; *F. S. Collins* MIN; *G. Engelmann* MO; *H. L. Jones* OC; *G. G. Kennedy* CU, POM, RM, WIS; *T. Morong* ISC, MO; *B. L. Robinson* US; *A. B. Seymour* DUKE; *W. Trelease* ILL, MO. NORFOLK: *C. E. Faxon* GH; *F. F. Forbes 14464* WIS. SUFFOLK: *J. R. Churchill* MO; *W. P. Rich* GH.

NEW HAMPSHIRE (1901). ROCKINGHAM: *B. L. Robinson 779* GH; *E. F. Williams* GH. STRAFFORD: *F. C. Seymour 4855* DUKE, WIS.

NEW JERSEY (1841). Indefinite locality: *R. C. Alexander* UC; *C. F. Austin* GH; *H. R. Bassler* KSC; *P. D. Knieskern* CU; *McMinn* US. ATLANTIC: *W. M. Benner 9742* WIS; *J. Bright 10941* MIN, *10942* WIS; *J. B. Brinton* MO. BERGEN: *G. Leiderman 63* WIS; *K. K. Mackenzie 602* ARIZ; *H. Moldenke 13886* CM; *W. Shear* WVA. CAMDEN: *G. W. Bassett* CM, GH, MT; *G. M. Beringer* MICH; *C. D. Fretz* UC; *C. A. Gross 8* GH; *A. MacElwee 1299* GH, KSC, MO, MT; *I. C. Martindale* GH, US, WIS; *W. H. Witte* NMC, RM. CAPE MAY: *E. B. Bartram* MT; *J. Bright* CM; *A. Gershoy 310* CU, GH; *E. P. Killip 150* US, *316* POM; *F. W. Pennell 2177* US; *W. H. Witte* RM. CUMBERLAND: *F. W. Pennell 14867* MIN; *T. Seal* CM. GLOUCESTER: *J. B. Brinton* US; *R. H. True 5604A* UC. HUDSON: *J. Carey* MO; *G. Thurber* GH; *W. M. Van Sickle* US. MIDDLESEX: *L. H. Lighthipe* MSC. MONMOUTH: *A. P. Kelley* MT. SALEM: *E. L. Core 5016* WVA; *E. C. Earle 679* TENN; *J. M. Fogg, Jr. 7792* MIN.

NEW YORK (1873). Indefinite locality: *S. B. Buckley* MO. ALBANY: *H. D. House 24278* CU, GH, *30376* CU. BRONX: *S. H. Burnham 726* GH; *J. Cohn* CU. COLUMBIA: *Muenscher & Clausen 4486* CU. GREENE: *H. D. House 25167* GH; *Muenscher & Clausen 4483* CU, GH, *4484* CU, GH, US. MANHATTAN: *E. C. Howe 2615* IA. NASSAU: *A. Gershoy* CU; *Muenscher & Curtis 6125* CU, *6126* CU. QUEENS: *F. W. Hulst* ILL; *J. Schrenk* CU. RENSSELAER: *H. D. House 27059* CAS; *Muenscher, Brown, & Langdon 21576* CU. RICHMOND: *N. L. Britton* CM; *J. A. Drushel 8208* ILL, WIS, *8211* ILL, MO; *A. Gershoy 796* CU. ROCKLAND: *Muenscher & Curtis 5722* CU. SUFFOLK: *E. S. Miller* CM, US; *Muenscher & Curtis 6127* CU, *6128* CU; *H. St. John 2712* CU, GH, US; *H. Schrenk* CU, MO, WIS; *S. H. Wright* MT; *H. W. Young* MT. ULSTER: *Isely, Muenscher, & Winne 2414* UARK; *Muenscher & Curtis 5721* CU. WESTCHESTER: *E. C. Howe* ILL; *Muenscher & Curtis 5718* CU, GH, *5719* CU, *5720* CU, MICH, WIS; *H. Schrenk* MO; *E. H. Walker* US.

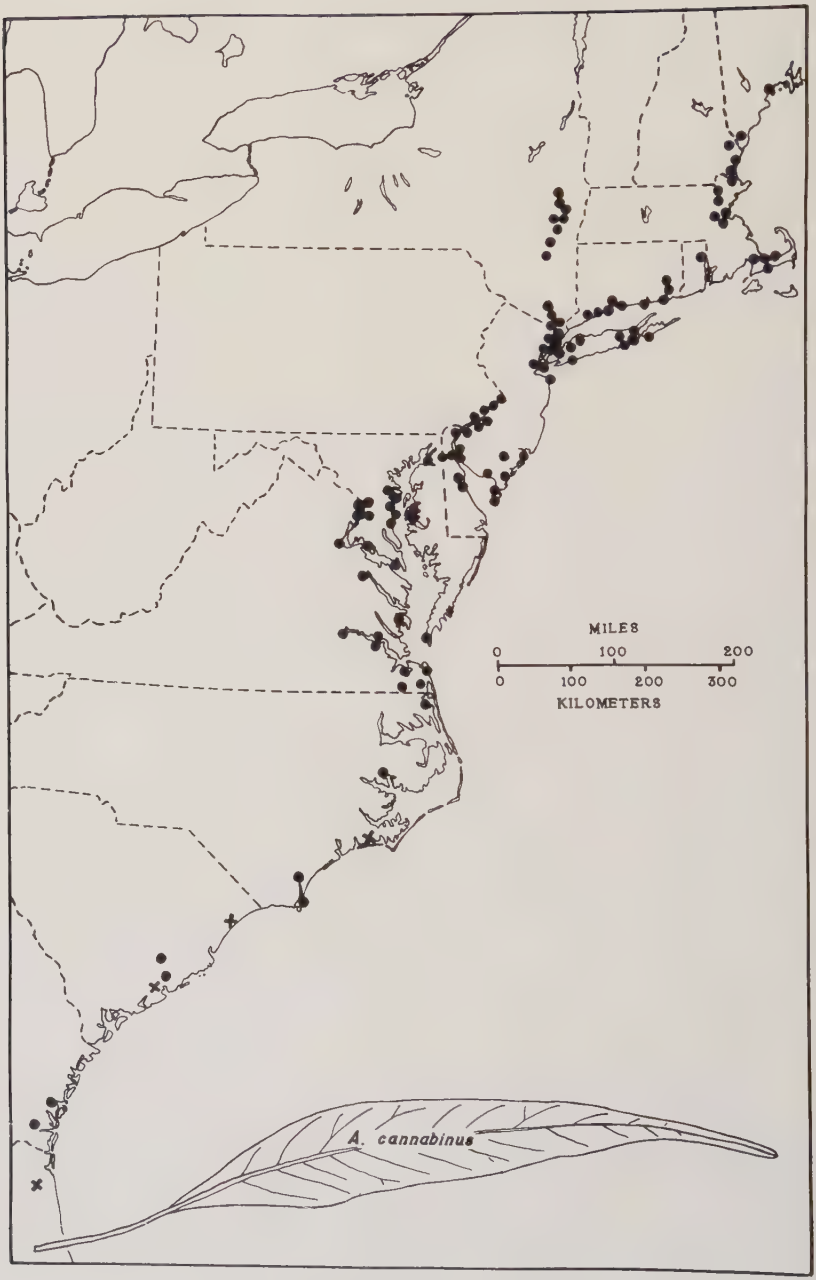

FIG. 3. *Amaranthus cannabinus:* distribution map. Atypical plants indicated by crosses.

NORTH CAROLINA (1885). Indefinite locality: *G. McCarthy 176* NCU, US. BEAUFORT: *A. E. Radford 5370* NCU. CARTERET: *A. E. Radford 5018* NCU. CURRITUCK: *W. L. McAtee 1170* US. NEW HANOVER: *Anonymous* US; *A. E. Radford 5039* NCU.

PENNSYLVANIA (1837). Indefinite locality: *E. Durand* GH. BUCKS: *E. B. Bartram 1292* GH, MT; *W. M. Benner* GH; *R. R. Dreisbach 3877* MICH. PHILADELPHIA: *R. C. Alexander* UC; *W. M. Benner 6966* GH; *I. C. Martindale* GH.

RHODE ISLAND (1844). PROVIDENCE: *W. W. Bailey* GH, MO, US; *J. W. Congdon* MIN, MO, NEB; *G. Thurber,* GH.

SOUTH CAROLINA (Before 1900). BERKELEY: *K. W. Hunt 1276C* CU; *H. W. Ravenal* GH. CHARLESTON: *C. P. Alexander 43* US. HORRY: *W. C. Coker* NCU.

VIRGINIA (1889). Indefinite locality: *F. G. Braendle* MIN. ARLINGTON: *A. Chase 2674* ILL; *A. S. Hitchcock* ILL; *T. Holm* ILL, MO; *A. J. Pieters* MICH; *E. S. Steele* DUKE, KSC, MIN, MO, MSC, MT, OC. ESSEX: *I. Tidestrom 7693* US. FAIRFAX: *F. R. Fosberg 23960* WIS, *23961* WIS; *G. H. Shull 191* GH, MO, *192* MO. JAMES CITY: *L. C. Artz 1134* WVA. MATHEWS: *Wherry & Pennell 12566* MO. NORFOLK: *F. Blanchard* MO, US; *Fernald & Long 11026* GH, *11027* GH. NORTHAMPTON: *W. M. Canby* ARIZ. PRINCE GEORGE: *Fernald & Long 10250* GH. PRINCESS ANNE: *Fernald & Griscom 2820* GH; *Fernald, Long, & Fogg 4877* GH. STAFFORD: *F. J. Hermann 9721* GH. SURRY: *Fernald & Long 9572* GH.

2. **Amaranthus australis** (A. Gray) comb. nov. *Acnida cuspidata* Bert. ex Spreng. Syst. Veg. 3:903. 1826. Non *Amaranthus cuspidatus* Vis. Cat. Hort. Patav. 1841. *Acnida cannabina* L. [var.] *β cuspidata* (Bert. ex Spreng.) Moq. in DC. Prodr. 13(2):277, 1849. *A. australis* A. Gray. Am. Nat. 10:489. 1876. *A. cannabina* L. [var.] *australis* (A. Gray) Uline & Bray, Bot. Gaz. 20:157. 1895. *A. alabamensis* Standl. N. Am. Flora 21:121. 1917.

Although Bertero's *Acnida cuspidata* is the first published name for this entity, because of the homonym rule, Gray's name is the one available when the species is transferred to *Amaranthus*. Gray's species was described from Florida collections which are excellent representatives of the species (syntypes: *A. W. Chapman s.n.,* Apalachicola, ♀ GH! here designated as lectotype; *E. Palmer 462,* Biscayne Bay, 1874, ♂ GH!). Standley, in erecting *A. alabamensis* (holotype: *C. T. Mohr s.n.,* swampy borders of tidewater streams, One-Mile Creek near Mobile, Alabama, ♀ US!; isotype: ♂ US!), to care for a few collections from the Gulf Coast was recognizing characters to be expected in populations of *A. australis* after slight introgression from *A. tuberculatus,* the other dioecious species in the area, notably, shorter staminate tepals, shorter pistillate bracts and less flattened seeds.

When all the available specimens of *A. australis* and *A. alabamensis* are assembled, morphological intergradation appears to be complete and there is no discontinuity which permits taxonomic separation.

Plants extremely stout and large with many ascending branches, usually 2 to 3 m. tall (although presumably annuals like the rest of the genus, members of this species sometimes reach surprising size, some having been reported as being 9 meters high[4]); leaf-blade lanceolate, often long at-

[4] Prof. A. J. Sharp has sent me a photograph, taken in a Florida swamp, showing a man climbing one of these plants as if it were a tree.

tenuate at the tip; flowering and fruiting mainly in summer and fall in the northern colonies, in all seasons in tropical colonies; thyrses flexible or moderately stiff, usually 5 to 10 cm. long; the terminal thyrse often accompanied by leafless branch thyrses and the uppermost of these not subtended by leaves; the branch thyrses somewhat more numerous and more crowded in the ♂ than in the ♀ plants; bract 1½ to 2 mm. long, midrib moderately heavy in ♂, heavy in ♀, not conspicuously excurrent in either; ♂ flowers with 5 stamens, the 5 tepals approximately equal, 2½ to 3 mm. long, the inner emarginate, the outer acuminate with excurrent midveins; ♀ flowers without perianth; utricle 1½ to 2 mm. long, indehiscent, slightly fleshy, with 3 to 5 prominent longitudinal ridges corresponding to the 3 to 5 style branches, not rugose, stramineous; seed 1 to 1¼ mm. in diameter, round, somewhat flattened with depressed endosperm, dark reddish brown.

The species is confined to wet places along the margins of both salty and fresh streams and water bodies. Almost every collection bears some such notation as: coastal swamp, mangrove swamp, coastal marsh, canal bank, lakeshore, riverbank, edge of lagoon, along bayou, shore of estuary, low hammock. There is no indication that the plants are every weedy invaders of artificial habitats. An isolated colony on the west coast of Mexico at the port of Manzanillo may have resulted from accidental human transport of seeds. The colony was probably ephemeral since it was reported but once and only staminate plants were found (Rose, 1895, p. 352).

CUBA. HABANA (1917). *Bros. Leon, Marie-Victorin,* & *Alain 22355* MT; *Bros. Leon* & *Roca 7272* MT.

HAITI. L'ARTIBONITE (1925). *E. L. Ekman H3358* US; *A. T. Sweet 70* GH, US.

SUD (1927). *W. J. Eyerdam 427* GH, US.

JAMAICA. Indefinite locality (ca. 1840). *J. Macfadyen* GH.

CORNWALL (1907). St. Elizabeth: *W. Harris 9760* US. Westmoreland: *Britton* & *Hollick 2102* US.

MEXICO. *COLIMA (1891). Manzanillo: *E. Palmer 1399* US.

QUINTANA ROO (1938). Cozumel: *Lundell* & *Lundell 7777* US.

TABASCO (1889). Centro: *J. N. Rovirosa 672* US.

TAMAULIPAS (1939). Altamira: *H. LeSueur 119* ARIZ, US.

*TRINIDAD (1914). *W. E. Broadway* US; *H. Crueger* GH.

UNITED STATES. ALABAMA (1879). Mobile: *C. T. Mohr* US.

FLORIDA (1867). Indefinite locality: *A. W. Chapman* GH, MO, US, WIS; *R. Combs 1102* CAS, NMC, RM; *H. C. Cowles* ILL; *J. H. Simpson* KSC, US. Alachua: *Laessle, West,* & *Arnold* FLAS. Citrus: *A. S. Hitchcock 591* NEB. Collier: *L. H. MacDaniels* CU. Dade: *E. A. Bessey* MSC; *H. N. Moldenke 531* DUKE, ILL, MO, US; *E. Palmer 462* GH, MO; *W. Rusby* MICH; *J. K. Small 10437* DUKE, FLAS, GH, TENN, US, WVA. Desoto: *H. O'Neill* FLAS, US. Duval: *A. Fredholm*

FIG. 4. *Amaranthus australis*: distribution map. Atypical plants indicated by crosses.

300 US. Franklin: *A. W. Chapman* GH, *151A* GH, MIN, MO, NCU, US. Gulf: *W. L. McAtee 1720* US; *B. F. Saurman 381* GH. Highlands: *J. B. McFarlin 6029* MICH. Hillsborough: *J. D. Smith* US. Lake: *G. V. Nash 868* CU, GH, MICH, MIN, MO, MSC, NEB, UC, US; *J. R. Watson 77* FLAS. Lee: *A. S. Hitchcock 299* CU, GH, KSC, MIN, MO, NEB, US. Manatee: *J. H. Simpson* MIN, MO, US, WIS. Monroe: *Muenscher & Thorne 18344* CU. Orange: *A. Fredholm 5470* GH. Palm Beach: *M. F. Baker* FLAS; *J. A. Harris N19335* MIN; *M. J. Murray 36075* CU, *36076* CU, *38135* CU; *H. O'Neill* MO; *Small & Carter* MIN; *Tisdale, Townsend, & West* FLAS. Polk: *J. B. McFarlin 4459* CAS, *4460* MICH. Putnam: *A. M. Laessle* FLAS.

LOUISIANA (1886). Iberia: *Correll & Correll 9535* DUKE, GH, MO. La Fourche: *G. Arceneaux 95* CU. Orleans: *R. S. Cocks* NO; *G. L. Fisher* WIS; *J. F. Joor* MO, US; *J. L. Riddell* NO; *E. Wilkinson* OC. Plaquemines: *Lloyd & Tracy 41* CM; *Tracy & Lloyd 24* CU, GH, MIN, MO, MSC, NEB, US, *37* CM, CU, GH, MIN, MO, NEB, UC, US, WIS. St. Bernard: *J. F. Joor* MO. St. Tammany: *W. T. Penfound* NO. Vermillion: *C. C. Sperry 385* US.

TEXAS (1884). Harris: *G. L. Fisher* CAS, *27* MT, US, *165* US; *J. F. Joor* MIN, MO, WIS. Orange: *V. L. Cory 50863* SMU. Travis: *B. C. Tharp 2864* MICH, US.

*VENEZUELA. ARAGUA (1942). *Killip & Lasser 37736* US; *H. Pittier 14996* US.

3. **Amaranthus tuberculatus** (Moq.) comb. nov. *A. altissimus* Riddell, Syn. Fl. W. States 41. 1835, *nom. prov. A. miamiensis* Riddell, loc. cit. 41. 1835, *nom. prov. Acnida tuberculata* Moq. in DC. Prodr. 13(2):277. 1849. *A. altissima* (Riddell) Moq. loc. cit. 278. 1849, *nom. nudum. A. cannabina* L. [var.] *β concatenata* Moq. loc. cit. 278. 1849. *Montelia tamariscina* (Nutt.) A. Gray var. *concatenata* (Moq.) A. Gray, Man. ed. 2. 370. 1856. *Acnida tuberculata* Moq. var. *subnuda* S. Wats. in A. Gray, Man. ed. 6. 429. 1889. *A. tamariscina* (Nutt.) Wood [var.] *subnuda* (S. Wats.) Coult. Mem. Torrey Club 5:145. 1894. *A. tamariscina* (Nutt.) Wood [var.] *tuberculata* (Moq.) Uline & Bray, Bot. Gaz. 20:157. 1895. *A. tamariscina* (Nutt.) Wood [var.] *prostrata* Uline & Bray, loc. cit. 158. 1895. *A. tamariscina* (Nutt.) Wood [var.] *concatenata* (Moq.) Uline & Bray, loc. cit. 158. 1895. *A. concatenata* (Moq.) Small, Fl. S.E. U.S. 393. 1903. *A. tuberculata* Moq. var. *prostrata* (Uline & Bray) B. L. Robinson, Rhodora 10:32. 1908. *A. altissima* (Riddell) Moq. ex Standl. N. Am. Flora 21:122. 1917. *A. subnuda* (S. Wats.) Standl. loc. cit. 122. 1917. *Amaranthus ambigens* Standl. loc. cit. 106. 1917. *Acnida altissima* (Riddell) Moq. ex Standl. var. *prostrata* (Uline & Bray) Fernald, Rhodora 43:288. 1941. *A. altissima* (Riddell) Moq. ex Standl. var. *subnuda* (S. Wats.) Fernald, loc. cit. 288. 1941.

This species probably first received taxonomic attention from Riddell, who proposed two new species, presumably based on his own Ohio collections: *Amaranthus altissimus* from "an old prairie near Hamilton," and *A. miamiensis* from "Hoffman's prairie, Dayton." His incomplete descriptions together with the localities suggest that both names refer to the taxon under consideration here. Unfortunately, Riddell added the statement: "I give these as merely temporary names, until the plants shall be

further investigated," thereby invalidating his publication of the names. One of his epithets, *miamiensis,* has never been validly published; the other was eventually adopted by Standley in a new combination but by then it was nomenclaturally superfluous. Although Moquin-Tandon cited no specimens, his description of *A. tuberculata,* made from living plants in the Geneva Botanical Garden leaves little doubt as to its identity. His type specimen of var. *concatenata* (holotype: *T. Drummond 552,* procumbent, New Orleans, Louisiana, 1832. Fragment in GH!), originally assigned to another species, although subtly different from typical *A. tuberculatus* (suggesting slight introgression from *A. australis*) is morphologically well within the limits of the species as defined here. In various combinations and ranks, *concatenata* has generally been recognized by subsequent workers as a distinct taxon. It has ordinarily been distinguished from *A. tuberculatus* by unusually large, round, widely-spaced glomerules, which give the pistillate inflorescence the look of a loose string of giant beads. Such inflorescences develop occasionally in many kinds of amaranths, either sterile hybrids or isolated pistillate plants which are not pollinated; in such plants seed set does not arrest vegetative growth of the inflorescence axis and flower initiation in each cyme. Watson's variety *subnuda* (holotype: *Oakes s.n.,*W. Vermont) is a different story. Watson's statements on morphology and geography indicate that his conception of the species proper was based on plants which were probably mostly hybrids between *A. tuberculatus* and *A. tamariscinus* while his variety was based on *A. tuberculatus* in its purest and most typical form. Uline and Bray distinguished their variety *prostrata* by a prostrate habit, small spatulate leaves, and a poorly developed terminal thyrse. They cited no specimens but stated "type specimens in Nat. Herb. and Mo. Bot. Gard." They apparently marked no sheets as types, but the following specimens bear their annotations as representing this variety: *G. Engelmann 257, 258,* St. Louis, Missouri, August to September, 1893, ♂♀MO!; *G. Engelmann s.n.,* American Bottom, Illinois, opposite St. Louis, October 7, 1867, ♂♀MO! WIS!; *C. A. Geyer 420,* Nicollet's Northwestern Expedition, Fort Pierre (South Dakota), June 29, 1839, ♀US!; *E. Hall s.n.,* riverbanks, Athens, Illinois, 1861, ♀US!; *G. H. Hicks s.n.,* Michigan Agricultural College grounds, September 1, 1892, ♀US!; *J. M. Holzinger s.n.,* Winona, Minnesota, August, 1890, ♂♀US!. All these specimens are well within the range of *A. tuberculatus* as circumscribed here, although the Engelmann collections show traces of mixing with *A. tamariscinus.* These specimens, and many others like them, are indeed conspicuously different from the usual form of *A. tuberculatus,* but the difference may not be hereditary. The key to the dissimilarity may be found in an unheeded note by Engelmann on his American Bottom collection: "*forma autumnalis,* in the bottom of dried swamps, a second crop." These plants are extremely sensitive to photoperiod, flower initiation being approximately simultaneous in all individuals within an area, regardless of size. By early and late greenhouse plantings, I have been able to obtain both

ordinary *tuberculatus* and the *prostrata* forms from seed of a single plant (*J. D. Sauer 1592–4, 1592–4A, 1592–10, 1592–10A,* WIS). Standley's *A. ambigens* is based on a sheet (*M. S. Bebb s.n.,* Fountaindale, Illinois, US!) bearing two plants, one of them an ordinary staminate plant and the other bearing abortive bisexual flowers, an anomaly among both dioecious and monoecious amaranths. Other sheets of this collection (CU!, MINN!, US!) bear only ordinary specimens of *A. tuberculatus*. Comparable monstrosities with sterile bisexual flowers have been collected elsewhere within the range of *A. tuberculatus* (*A. P. Anderson s.n.,* Goodhue County, Minnesota, US!; *W. S. Moffat s.n.,* DuPage County, Illinois, ILL!; *L. S. Cheney,* Dane County, Wisconsin, WIS!), as well as within the range of *A. arenicola* (*G. E. Osterhout 1141,* Logan County, Colorado, RM!).

Plants extremely variable in habit and size, prostrate, ascending, or erect, often very short but sometimes reaching 3 m. in height; leaf-blades extremely variable in size and shape, the smaller ones usually oblong or spatulate, the larger broadly ovate or lanceolate; flowering and fruiting entirely during summer and fall, mainly late July to early October; thyrse flexible, usually about 5 cm. long in ♂, 1 to 2 cm. long in ♀; in the ♂ plants several loosely arranged, leafless branch thyrses often present above the uppermost leaves; ♀ thyrses either entirely terminal on leafy branches or, if leafless branch thyrses present, these crowded and each subtended by a leaf; bract 1 to 1½ mm. long; midrib very slender in ♂, slender in ♀, excurrent far beyond lamina; ♂ flowers with 5 stamens, the 5 tepals approximately equal, 2½ to 3 mm. long, the inner obtuse or emarginate, outer acuminate, the midveins not excurrent; ♀ flowers usually without perianth, occasionally with 1 or 2 irregular, rudimentary tepals; utricle 1½ to 2 mm. long, indehiscent, thin, smooth or irregularly tuberculate, sometimes with faint ridges corresponding to the 3 or 4 style branches, often reddish; seeds ¾ to 1 mm. in diameter, often obovoid, lenticular, dark reddish brown.

The species is at home on the margins of freshwater bodies of all sorts: rivers, creeks, lakes, ponds, marshes, and bogs. Nearly 90 per cent of all collections which bear habitat data are from such places. The plants are especially abundant in a narrow zone close to the water's edge, where falling water level has exposed a strip of bare sand or mud. Much of the vegetative variability within the species may be traceable to variations in the growing season available in such sites. The species also occupies another quite different group of habitats: artificially disturbed places such as fields, gardens, and roadsides. Where such places are available in low ground close to its natural habitats, the species commonly moves in as a weed. Elsewhere it has had little success as a weed.

CANADA. ONTARIO (1871). Carleton: *Frere Marie-Victorin* MT; *Frere Rolland* GH, IND, MT. Essex: *W. S. Cooper* ARIZ. Hastings: *J. Macoun 1506* GH. Huron: *J. A. Morton 1828* ILL, MIN, US. Russell: *J. Macoun 86622* GH, *86623* GH, *86624* GH.

QUEBEC (1889). WRIGHT: *J. Macoun* GH, MO, *16* GH; *W. Scott* CU.

UNITED STATES. ALABAMA (ca. 1875). Indefinite locality: *S. B. Buckley* MO.

ARKANSAS (1929). CHICOT: *D. Demaree 14062* (in part) US. CRAIGHEAD: *D. Demaree 7095* GH, TEX, UARK, US, WIS, *27501* ISC. MISSISSIPPI: *D. Demaree 7186* US. PHILLIPS: *D. Demaree 30234* OKL, TEX.

CONNECTICUT (1896). HARTFORD: *C. H. Bissell* GH. NEW HAVEN: *E. B. Harger 18* GH.

ILLINOIS (1840). ADAMS: *R. Brinker 3768* ILL. CARROLL: *M. B. Waite* ILL. CHAMPAIGN: *G. P. Clinton* ILL; *F. Coates* ILL; *H. A. Gleason 76* GH; *G. N. Jones 12905* IA, ILL, MIN, MO, US, *13136* ILL, *13279* ILL; *A. S. Pease 13016* GH; *A. B. Seymour* DUKE; *W. Trelease* ILL. CHRISTIAN: *W. E. Andrews* ILL. COOK: *R. Bebb 2123* MIN, OKL, WIS; *J. R. Churchill* GH, RM; *G. Engelmann* MO; *E. J. Hill 74* ILL, *116* ILL, *165* ILL; *W. S. Moffatt* MIN, OC, WIS, *429* ILL, *611* ILL, OC; *N. L. T. Nelson* MIN, UC, WIS; *W. C. Ohlendorf* MO, US; *L. H. Pammel* ISC; *E. E. Sherff 1726* MO; *M. W. Strahler* WIS; *L. M. Umbach 1168* WIS, *1333* WIS, *4880* WIS, *5931* WIS; *G. S. Winterringer 1558* ILL, US. DOUGLAS: *G. S. Winterringer 153* ILL. DU PAGE: *W. S. Moffatt* ILL, *267* ILL, *287* MIN, *609* WIS, *612* ILL, MO; *L. M. Umbach* GH, ILL, MICH, MIN, MO, MSC, OC, OKL, UC, US, WIS. FULTON: *V. H. Chase 10908* ILL. GRUNDY: *G. S. Winterringer 81* ILL, *83* ILL. HENDERSON: *H. N. Patterson* GH, ILL, MO, US, WIS. IROQUOIS: *G. S. Winterringer 84* ILL. JACKSON: *H. E. Ahles 5769* ILL; *H. A. Gleason 1685* GH. KANE: *J. D. Sauer 1599* WIS. KANKAKEE: *Anonymous* ILL; *C. C. Crampton 540* US. KENDALL: *G. S. Winterringer 82* ILL. LAKE: *O. C. Durham* GH; *E. J. Palmer 28331* MO; *L. M. Umbach 1353* WIS. LASALLE: *G. Engelmann* MO; *G. D. Fuller 3256* (in part) ILL; *Koster & Koster 5* CU, *6* CU; *L. M. Umbach* WIS, *955* WIS. LAWRENCE: *J. P. Sivert* ILL. LIVINGSTON: *J. D. Sauer 1601* ILL, NO, WIS. MACON: *R. G. Mills* ILL; *G. S. Winterringer 639* ILL. MACOUPIN: *W. E. Andrews* ILL; *J. D. Sauer 1608* WIS. MASON: *H. E. Ahles 3423* ILL; *R. J. Miller* ILL. MCHENRY: *W. A. Nason* ILL; *G. R. Vasey* MO. MCLEAN: *Anonymous* CM; *J. D. Sauer 1606* ILL, NO, WIS. MENARD: *E. Hall* ILL, US. OGLE: *M. S. Bebb* CU, MIN, US; *M. B. Waite* US. PEORIA: *H. A. Anderson* IA; *F. Brendel* ILL, US; *F. E. McDonald* ILL, NMC, UC; *J. T. Stewart* WIS. PIATT: *A. S. Pease 14086* GH; *A. B. Seymour* DUKE. PIKE: *J. Davis 3785* ILL; *J. D. Sauer 1618* ILL, WIS. POPE: *E. J. Palmer 17018* MO. PUTNAM: *V. H. Chase 10832* ILL, *10833* ILL. RANDOLPH: *H. E. Ahles 5635* ILL. ROCK ISLAND: *A. B. Seymour* DUKE; *B. Shimek* IA. SAINT CLAIR: *E. Douglass* WIS; *H. Eggert* CU, CM, GH, KSC, MIN, MO, UC, US, WIS; *G. Engelmann* MO, WIS; *A. S. Hitchcock* MO; *J. H. Kellogg* MO; *J. B. S. Norton* WIS; *L. H. Pammel* WIS; *J. A. Steyermark 843* MO; *L. F. Ward* US; *W. Welsch* ILL. SANGAMON: *G. D. Fuller 7911* ILL. SCHUYLER: *J. D. Sauer 1618* ILL, WIS. STARK: *V. H. Chase 714* MO, *4375* WIS. STEPHENSON: *C. F. Johnson* US. TAZEWELL: *V. H. Chase 3223* MO, *7914* ILL, *7915* ILL, *10900* ILL; *A. B. Seymour* DUKE. WABASH: *J. Schneck* GH, ILL, *97* ILL; *H. Shearer* ILL. WINNEBAGO: *R. B. Anthony* WIS; *M. S. Bebb* IA, ILL, MICH, MO, OKL, WIS; *S. C. Wadmond* MIN.

INDIANA (1854). BLACKFORD: *C. C. Deam 343* US. CLARK: *C. Mohr* US. DEARBORN: *C. C. Deam 50790* WIS, *55886* WVA. ELKHART: *J. S. Brooks 1447* IND. HOWARD: *C. M. Ek* CAS, *153* US. JACKSON: *C. C. Deam 38062* IND. JAY: *C. C. Deam 59138* IND. JOHNSON: *H. M. Clarke* WIS. KOSCIUSKO: *C. C. Deam 21931* IND, *21984* IND; *Yuncker & Welch 10666* GH, NO. LAKE: *C. C. Deam 1760* IND; *J. M. Greenman 3192* MO; *P. C. Standley 57472* IND, *57476* IND; *L. M. Umbach* US, *1376* WIS, *1381* WIS, *4678* WIS. LAWRENCE: *R. M. Kriebel 1354* IND. MARION: *R. C. Friesner 18125* GH, OC, WVA, *18126* OKL; *W. Rhoades* TENN; *J. S. Wright* NMC. MARSHALL: *C. C. Deam 21010* IND; *Scovell & Clark 1364* US. MONTGOMERY: *E. W. Olive* SDC. MORGAN: *P. Weatherwax* IND. NEWTON: *C. C. Deam 57326* IND. NOBLE: *C. C. Deam 54495* IND. OWEN: *C. C. Deam 23928* IND; *Haas & Welch 4971*

IND, *4972* IND, *4973* IND; *S. C. Hood 4025* FLAS. Porter: *C. C. Deam 26526* IND; *E. J. Hill 119* ILL; *L. M. Umbach 5134* WIS. Posey: *C. C. Deam 10062* IND, *22292* IND, *22297* IND, *22298* MIN, *22304* CAS, *24293* MT, *24303* MT. Pulaski: *C. C. Deam 46363* IND. Randolph: *C. C. Deam 15442* IND, MIN. Ripley: *C. C. Deam 55894* IND. St. Joseph: *J. A. Nieuwland* MT, US, *11511* MO. Vanderburg: *H. M. Zelner* IND. Warren: *C. C. Deam 51294* IND. Wells: *C. C. Deam* IND, *467* IND. White: *C. C. Deam 51252* IND. Whitley: *C. C. Deam 59164* IND, OKL.

IOWA (1873). Indefinite locality: *J. C. Arthur 65* MO. Allamakee: *W. L. Tolstead* ISC. Benton: *J. J. Davis* WIS. Blackhawk: *M. Burk 581* MO, *874* ILL, *892* ILL, MO. Boone: *G. M. Lummis* ISC. Bremer: *B. Shimek* IA. Butler: *J. D. Sauer 1696* WIS. Des Moines: *P. Bartsch* IA. Dickinson: *B. Shimek* IA. Dubuque: *A. Horr* GH; *W. A. Weber 1937* COLO. Emmet: *R. I. Cratty* IA, OC; *F. W. Paige* ISC; *B. Shimek* IA. Fayette: *B. Fink* GH, ISC, MIN, OC, US. Hamilton: *B. Shimek* IA. Hancock: *B. Shimek* IA. Hardin: *L. H. Pammel* ISC; *B. Shimek* IA. Johnson: *A. S. Hitchcock* IA, MO; *B. Shimek* IA; *M. P. Somes 3910* US, *4400* ISC, *4428* ISC, *4429* ISC. Lee: *J. L. Fults 1624* (in part) ISC; *L. H. Pammel* ISC; *P. H. Rolfs* ISC; *B. Shimek* IA. Muscatine: *H. W. Clark* US; *F. Reppert* IA; *M. P. Somes 3722* MO. Story: *Anonymous* ISC; *C. E. Bessey* GH; *A. Hayden 319* ISC; *A. S. Hitchcock* KSC, MO, MSC. Wapello: *L. H. Pammel* ISC. Warren: *L. H. Pammel* ISC. Webster: *C. H. Churchill* ISC. Winnebago: *L. H. Pammel* ARIZ; *B. Shimek* IA. Winneshiek: *H. Goddard* ISC; *W. L. Tolstead* ISC.

KENTUCKY (1840). Indefinite locality: *C. W. Short* CINC, MO. Breckenridge: *McFarland, Plymale, & Schacklette 14* MT. Kenton: *M. G. Williams* WIS.

LOUISIANA (1832). Indefinite locality: *W. M. Carpenter* MO, US, WIS. Avoyelles: *G. Ware* WIS. Orleans: *R. S. Cocks* NO; *T. Drummond 552* GH; *J. F. Joor* MIN, MO. Rapides: *J. Hale* US. St. Charles: *J. Howard* NO.

*MAINE (1899). Oxford: *W. H. Allen* GH.

*MASSACHUSETTS (1899). Hampden: *L. Andrews 6* GH. Middlesex: *M. L. Loomis* GH; *E. F. Williams* GH. Worcester: *Anonymous* GH.

MICHIGAN (1838). Indefinite locality: *E. J. Cole* MIN; *C. F. Wheeler* MIN, MSC. Berrien: *C. Billington* MICH, MSC. Cass: *H. S. Pepoon 73* MSC. Genesee: *D. Clarke 23* CM, *466* (in part) MSC, *2023* MSC. Gratiot: *C. A. Davis* GH, ILL, MICH, MIN, MO, MSC, OC, POM, RM, TENN, UC, WIS. Ingham: *L. H. Bailey, Jr.* GH; *C. F. Baker* POM; *W. J. Beal* MSC; *G. H. Hicks* US; *H. C. Skeels* MSC; *G. D. Sones* MO; *J. W. Toumey* ARIZ, NDA; *C. F. Wheeler* MSC, WIS. Ionia: *C. F. Wheeler* POM, US. Kent: *C. W. Bazuin 711* MSC; *W. Boott* GH; *H. C. Skeels* MSC. Lenawee: *C. H. Stocking* MICH. Macomb: *D. Cooley* MSC. Monroe: *M. E. Day* OC. Muskegon: *C. D. McLouth* MSC. Oakland: *C. Billington* MICH. Ottawa: *E. J. Cole* MSC. Saint Clair: *C. K. Dodge* GH, MICH, MIN, MO, MSC, OC, RM, TENN, TEX, US, WIS, *266* US. Van Buren: *L. M. Umbach* WIS. Washtenaw: *C. Billington* MICH; *J. H. Ehlers 1452* MICH, *5503* MICH; *F. J. Hermann 9178* MICH, MO, US; *A. J. Pieters* MICH.

MINNESOTA (1848). Indefinite locality: *C. C. Parry* US. Aitkin: *J. H. Sandberg 767* MIN, MSC, US. Beltrami: *Butters & Rosendahl 6578* MIN; *P. Jones 422* MIN, *423* MIN. Cass: *E. L. Nielson 1799* MIN. Chippewa: *L. R. Moyer 1410* MIN; *J. B. Moyle 3255* MIN, *3505* MIN. Clay: *H. F. Bergman* NDA. Clearwater: *M. L. Grant 3139* MIN. Freeborn: *J. B. Moyle 4001* MIN. Goodhue: *A. P. Anderson* GH, UC, US, WIS, *772* MIN, *830* MIN; *C. O. Rosendahl 6792* MIN; *J. H. Sandberg* MIN. Hennepin: *F. H. Burglehaus* MIN; *Butters & Rosendahl 3410* CU, MIN, *3413* MIN, *3414* MIN; *E. A. Mearns 837* US; *T. S. Roberts* MIN. Houston: *W. A. Wheeler 522* MIN, *547* MIN, *598* MIN. Lesueur: *J. B. Moyle 2901* MIN. Ramsey: *E. Mearns 839* US; *Moore & Moore 13631* GH, ISC, MIN. Rice: *Moore & Moore 10283* MIN, *10284* IA, ILL, MIN, MT, UC. Stearns: *F. W. Dewart* MO. Wabasha: *S. M. Manning* MIN; *L. H. Pammel* ISC. Washington: *J. W. Moore 16048* MIN;

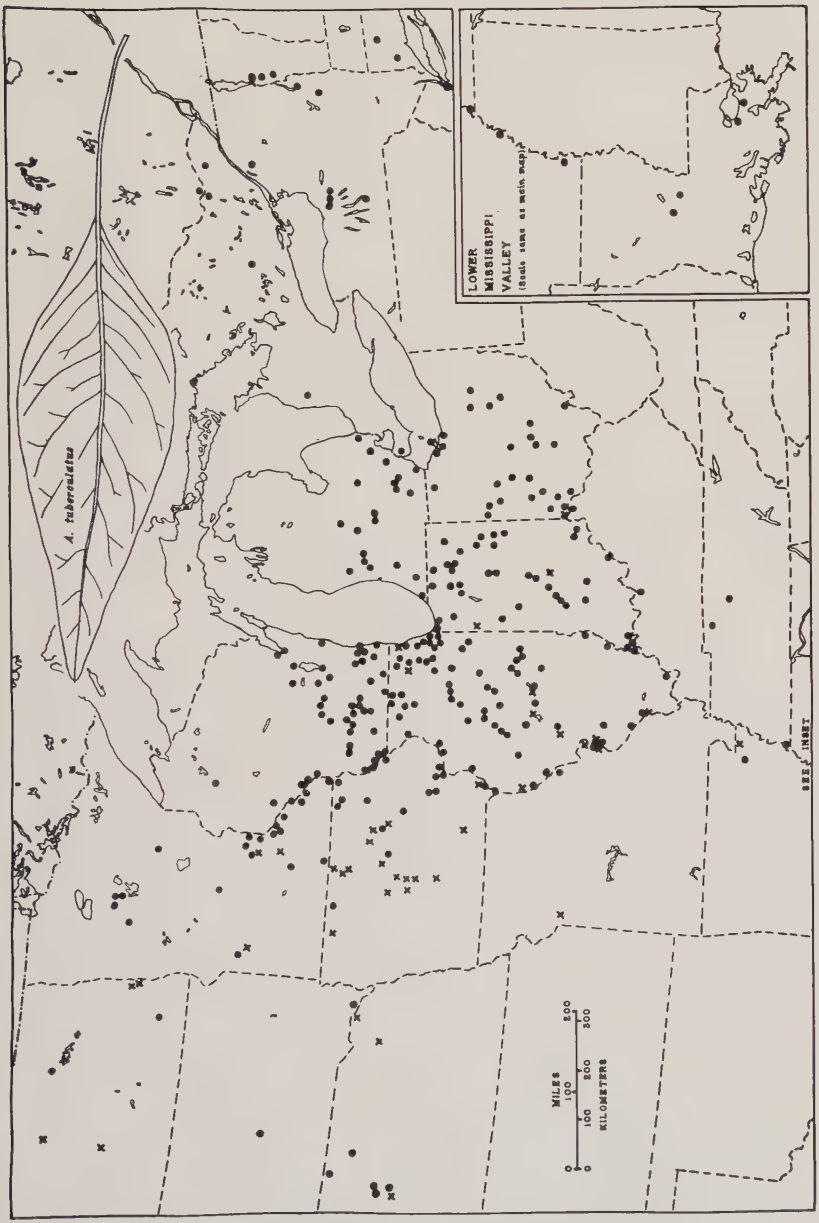

FIG. 5. *Amaranthus tuberculatus:* distribution map. Atypical plants indicated by crosses.

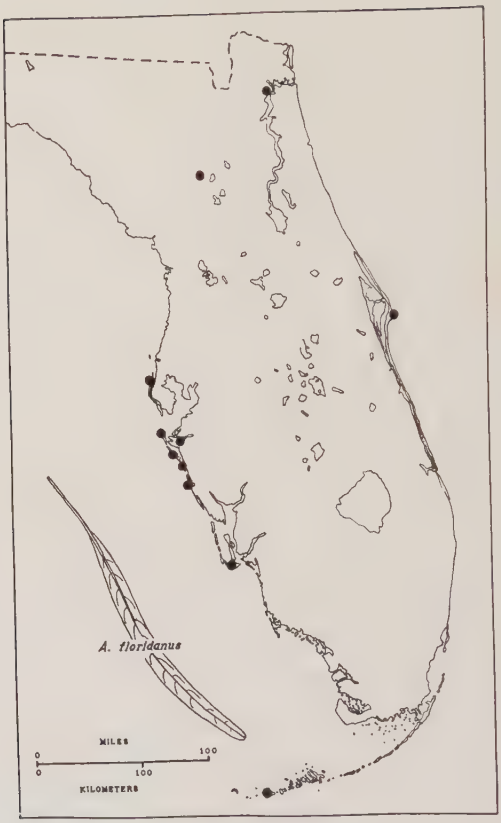

Fig. 6. *Amaranthus floridanus:* distribution map.

Moore & Moore 10434 MIN, TEX, *10630* MIN. Winona: *J. M. Holzinger* CU, ISC, MIN, RM, US, UTC.

MISSOURI (1832). Jackson: *B. F. Bush 278* KSC, MO, US, WIS. Pike: *W. Trelease 816* MO. Saint Charles: *E. Douglass* MO. Saint Louis: *T. Drummond* GH, *38* GH, *311* (in part) GH; *G. Engelmann* GH, *255* MO, *257* MO, *258* MO; *L. O. Overholts* MO; *J. A. Steyermark 8971* MO; *W. Trelease* MO, WIS.

NEBRASKA (1853). Indefinite locality: *F. V. Hayden* MO; *P. A. Rydberg* NEB. Cedar: *T. A. Bruhin* WIS. Cherry: *J. M. Bates* NEB; *R. Thomson 83* US. Grant: *Rydberg & Tulen 1644* NEB, US, *1674* (in part) GH, *1778* NEB, US. Hooker: *R. Thomson 265* US. Pierce: *N. F. Petersen* NEB.

NEW YORK (1900). Cayuga: *M. R. Garner 19389* CU. Onondaga: *Muenscher & Brown 22061* CU, GH; *K. M. Wiegand* CU. Richmond: *A. Hollick* US. Saint Lawrence: *O. P. Phelps 418* CU, GH, US, *1152* CU, GH, *1153* CU, GH. Saratoga: *Muenscher & Lindsey 3239* CU. Tompkins: *F. P. Metcalf 6399* CU. Washington: *S. H. Burnham* GH.

NORTH DAKOTA (1860). Benson: *J. Lunell 408* MIN, *585* MIN. Cass: *H. F. Bergman* MO, MIN, NDA; *O. A. Stevens* NDA, *1399* NDA, WIS. Oliver: *F. V. Hayden* MO. Ransom: *Fieldstand 1097* NDA. Ward: *O. Lakela 504* MIN.

OHIO (1833). Indefinite locality: *J. R. Paddock* ILL; *R. Peter* MICH. Auglaize: *A. Wetzstein* OS. Butler: *D. Demaree 27354* ISC. Champaign: *W. A. Keller-*

man OS. CLERMONT: *E. L. Braun* CINC; *D. L. James* OS; *James & James* OS. COSHOCTON: *F. B. Selby 209B* OS. ERIE: *E. L. Moseley* CM, US; *W. Whitney* OC. FAIRFIELD: *W. Goslin* OS; *Goslin & Goslin* OS. FRANKLIN: *M. J. Murray 38140* CU; *Schaffner & Brown 4* OS; *W. C. Werner 110* (in part) GH, *111* GH. GREENE: *M. Mohr 577* CINC. HAMILTON: *Anonymous* CINC; *E. L. Braun* CINC; *R. Buchanan* CINC; *T. H. Kearney, Jr.* OS; *C. G. Lloyd* US, *2376* GH, MICH, MSC; *C. W. Short* GH; *M. G. Williams* WIS. HOLMES: *W. A. Kellerman* OS. LOGAN: *Kellerman & Beattie* OS. LUCAS: *E. L. Moseley* MICH. MEIGS: *W. A. Kellerman* OS. MERCER: *C. E. Thorne 1794* OS. MONTGOMERY: *B. Frank* MO; *S. E. Horlacher* OS. OTTAWA: *E. L. Moseley* GH, OS, US. PICKAWAY: *Bartley & Pontius* OS. ROSS: *Bartley & Pontius* OS. SHELBY: *Kellerman & Beattie* OS; *E. S. Thomas* OS. STARK: *Mrs. T. W. Case* OS. WARREN: *E. B. Harger 8180* GH. WAYNE: *Bontrager & Greene* OS.

SOUTH DAKOTA (1839). CLAY: *W. H. Over 5136* US. STANLEY: *C. A. Geyer 420* US.

TENNESSEE (1877). DAVIDSON: *A. Gattinger* US; *W. H. Seaman* US; *L. F. Ward* MO, US. MONTGOMERY: *A. Clebsch 664* TENN. SHELBY: *Norris & Sharp 16323* TENN, *16327* TENN.

VERMONT (1882). ADDISON: *E. Brainerd* GH; *C. E. Faxon* GH. RUTLAND: *D. L. Dutton* CM, CU, DUKE, KSC, MO.

WISCONSIN (c. 1845). ADAMS: *N. C. Fassett 22735* WIS. BROWN: *J. H. Schuette* CAS, GH, IA, MICH, MIN, OKL, POM, UC, US, WIS. BUFFALO: *R. H. Denniston* WIS. DANE: *R. Burton 40* WIS; *L. S. Cheney* WIS; *J. R. Churchill* GH, MO, WIS; *J. J. Davis* GH, WIS; *N. C. Fassett 22733* WIS, *22734* WIS; *T. J. Hale* WIS; *J. R. Heddle 1430* WIS; *G. N. Jones 17694* ILL; *J. D. Sauer 1590* ARIZ, CAS, COLO, FLAS, MT, NCU, NDA, NMC, NO, SDC, TENN, UARK, *1592* WIS; *L. H. Shinners 1460* WIS; *E. E. Terrell 2422* WIS; *W. Trelease* MO, WIS; *R. H. True* WIS; *J. H. Zimmerman 3426* WIS, *3608* WIS. DODGE: *L. H. Shinners 1458* WIS. FOND DU LAC: *J. J. Davis* WIS; *Waters & Pammel* ISC. GRANT: *R. B. Anthony* MIN, WIS; *J. J. Davis* UC, WIS; *N. C. Fassett 12620* WIS, *13649* WIS, *13656* WIS, *14168* WIS, *14170* WIS, *14201* WIS; *H. H. Smith 7738* WIS, *7739* WIS. GREEN LAKE: *Fassett & Sperry 18389* WIS; *L. H. Shinners* WIS. IOWA: *J. J. Davis* WIS; *G. N. Jones* 17633 ILL; *C. T. Mason, Jr. 1489* WIS. LA CROSSE: *J. J. Davis* WIS; *D. S. Pammel* ISC; *L. H. Pammel* ISC, UTC. LAFAYETTE: *L. S. Cheney* WIS. MARQUETTE: *N. C. Fassett 15327* WIS. MILWAUKEE: *I. A. Lapham* GH, WIS; *Morgan & Morgan 635* IA; *W. W. Oppel C2* GH; *R. Pohl 1343* MIN; *L. H. Shinners 1457* WIS. OUTAGAMIE: *P. O. Schallert 658* DUKE. PEPIN: *E. A. Baird* WIS. PIERCE: *N. C. Fassett 5314* WIS. RACINE: *J. J. Davis* DUKE, ILL, WIS; *J. R. Heddle 300* WIS; *S. C. Wadmond* MIN. RICHLAND: *E. K. Jones 406* WIS. ROCK: *G. B. Olds* WIS; *G. D. Swezey* CAS. SAUK: *J. J. Davis* WIS; *Levi & Rose* WIS; *H. F. Luders* US; *A. B. Seymour* DUKE. SAWYER: *Gilbert & Fassett 8228* WIS. SHEBOYGAN: *C. Goessl* WIS. TREMPEALEAU: *E. A. Baird* WIS; *N. C. Fassett 5311* WIS, *5312* GH, DUKE, WIS. WALWORTH: *G. R. Kleeberger* CAS; *S. C. Wadmond* MIN. WAUKESHA: *G. H. Cornwell* WIS; *I. Cull 315* WIS; *H. C. Greene* WIS. WAUPACA: *Fassett & Rhodes 13169* WIS.

4. **Amaranthus floridanus** (S. Wats.) comb. nov. *Acnida floridana* S. Wats. Proc. Am. Acad. 17:376. 1882.

This species was described from a homogeneous group of Florida collections (syntypes; *J. L. Blodgett s.n.*, Key West, ♂ GH!, here designated as lectotype; *A. W. Chapman s.n.*, sandy coast at North Clear Water Pass, 1875, ♀ MO!; *A. P. Garber s.n.*, South Florida, 1876, ♀ GH!). Watson also mentioned a Curtiss collection without identifying it (probably *A. H. Curtiss 115*, Florida, 1880, ♀ GH!).

Plants slender, erect, with ascending branches, usually about 1 m. tall; leaf-blade very small, linear to narrowly oblong; flowering and fruiting from late spring through early fall; thyrses flexible, usually 10 to 20 cm. long, either all terminal on leafy branches or, if leafless branch thyrses present, these widely spaced and each subtended by a leaf; bract 1 to 1½ mm. long, the midrib moderately heavy in ♂, heavy in ♀, not conspicuously excurrent in either; ♂ flowers with 5 stamens, the 5 tepals approximately equal, 2 to 2½ mm. long, the inner obtuse or emarginate, the outer obtuse or acute, with midveins excurrent; ♀ flowers usually with 1 or 2 tepals, the shorter tepal rudimentary, the longer 1 to 1½ mm. long, narrowly lanceolate, acuminate, with excurrent midvein; utricle about 1½ mm. long, indehiscent, thin or slightly fleshy, irregularly rugose, sometimes with faint ridges corresponding to the 3 style branches, often reddish; seeds ¾ to 1 mm. in diameter, round, lenticular, dark reddish brown.

The inadequate habitat data indicate that the species is a native of coastal dunes and beaches, but has become a local weed in gardens and fields near the coast.

UNITED STATES. FLORIDA (ca. 1850). Indefinite locality: *A. W. Chapman* MO, US; *A. H. Curtiss* MIN, *115* GH; *A. P. Garber* GH; *J. B. McFarlin* TEX; *J. H. Simpson* US. ALACHUA: *E. West* FLAS. BREVARD: *A. H. Curtiss 5775* CU, FLAS, GH, ILL, ISC, KSC, MIN, MO, MSC, NEB, POM, UC, US, WIS, *5775A* GH. DUVAL: *A. H. Curtiss* US. LEE: *S. M. Tracy 7621* CU, CM, GH, ISC, MIN, MO, MSC, NEB, UC, US, WIS. MANATEE: *A. Cuthbert* FLAS; *J. B. McFarlin 6158* MICH; *J. H. Simpson 43* MO. MONROE: *J. L. Blodgett* GH. PINELLAS: *A. W. Chapman* MO. SARASOTA: *A. W. Chapman* GH, MO; *A. H. Curtiss 2373* GH, MIN, US; *J. B. McFarlin 6184* CAS, *6185* UC.

5. AMARANTHUS TAMARISCINUS Nutt. Trans. Am. Phil. Soc., new ser. 5:165. 1837. *Montelia tamariscina* (Nutt.) A. Gray, Man. ed. 2. 370. 1856 (*pro parte*). *Acnida tamariscina* (Nutt.) Wood, Am. Bot. and Fl. 289. 1870.

Nuttall described this species as abundant on the sand beaches of the Arkansas and Grand (Neosho) rivers in what is now Oklahoma. His specimens, which I have not seen, are reported to be so immature that they show few diagnostic characters (Uline and Bray, 1895, p. 157; Gray, 1876, p. 489). However, the partial description and the locality make it reasonably certain that Nuttall was dealing with the species under consideration here. He could hardly have chosen a place closer to the heart of the range of this species, nor one more typical of its habitat.

Plants usually stout and erect, with ascending branches, 1 to 2 m. high; leaf-blade usually oblong to lance-oblong; flowering and fruiting entirely during summer and fall, mainly July through October; thyrses stiff, usually 10 to 20 cm. long, either all terminal on leafy branches or, if leafless branch thyrses present, these loosely arranged and each subtended by a leaf (by a leaf scar late in the season); bract 1½ to 2 mm. long, with moderately heavy, excurrent midrib in ♂, about 2 mm. long with heavy,

excurrent midrib in ♀; ♂ flowers with 5 stamens and 5 tepals, the inner tepals about 2½ mm. long, obtuse or emarginate, outer tepals about 3 mm. long, acuminate, with conspicuous, excurrent midveins; ♀ flowers with 1 or 2 tepals, the shorter tepal rudimentary, the longer about 2 mm. long, narrowly lanceolate, acuminate, with moderately heavy, sometimes branched excurrent midvein; utricle about 1½ mm. long, circumscissile, thin, rugose, sometimes with faint ridges corresponding to the 3 or 4 style branches, often reddish; seeds about 1 mm. in diameter, round, lenticular, dark reddish brown.

The species is at home on the margins of inland water bodies: river floodplains, streambanks, sandbars, muddy lakeshores, the edges of ponds, marshes. About two-thirds of all collections with habitat data are from such apparently natural sites. However, the species has very definite weedy tendencies and about one-third of the collections is from artificial habitats: roadsides, railroad rights-of-way, fields and gardens. Even in the heart of its range the species is a common weed where fields and ditches have invaded its native riverbottoms. The migrants along the margins of the main range and the isolated waifs which turn up sporadically far outside the main range are almost invariably weeds of places disturbed by man.

UNITED STATES. ALABAMA (1893). Mobile: *C. T. Mohr* US.

ARKANSAS (1894). Indefinite locality: *B. F. Bush 479* MO, *480* WIS. Benton: *B. F. Bush 15778* MO, NEB; *D. M. Moore 29020* UARK. Chicot: *D. Demaree 14062* (in part) CAS, MIN, MO. Faulkner: *F. A. Haas 1064* US, *1065* US. Independence: *W. Trelease* MO. Jackson: *D. Demaree 20365* ISC, MO, *20368* WIS. Jefferson: *D. Demaree 8768* CAS, US, *8775* MO, OC, US, *18589* MO. Lawrence: *P. H. Rolfs* ISC. Marion: *D. Demaree 20602* MO. Miller: *G. Ware* WIS. Prairie: *D. Demaree 18534* MO. Pulaski: *D. Demaree 8325* CM, GH, MO, *8326* US, *8327* CM, *8356* DUKE, *8360* GH, WIS, *8428* CAS, MO; *G. M. Merrill 659* DUKE, *999* UARK.

*DELAWARE (1896). Newcastle: *A. Commons* GH, MO: *E. Tatnall* US.

*IDAHO (1897). Payette: *L. F. Henderson 2981* GH.

ILLINOIS (1860). Indefinite locality: *W. E. Andrews* ILL. Adams: *R. Brinker 22989* ILL. Champaign: *H. M. Franklin* ILL; *G. N. Jones 13129* ILL, *17498* ILL. Christian: *Winter & Sauer 1621* WIS. Clinton: *H. E. Ahles 5715* ILL. Cook: *O. E. Lansing, Jr. 2632* GH; *W. S. Moffatt 276* ILL, *483* ILL; *W. C. Ohlendorf* OC. Douglas: *G. S. Winterringer 12* ILL, *19* ILL. Grundy: *G. N. Jones 17760* ILL. Kane: *J. D. Sauer 1600* WIS. La Salle: *G. D. Fuller 3256* (in part) ILL. Pike: *J. D. Sauer 1619* WIS. Saint Clair: *E. Douglass* MO; *H. Eggert* MO; *G. Engelmann* MO, WIS; *J. B. S. Norton* WIS. Tazewell: *V. H. Chase 8589* ILL. Vermilion: *G. N. Jones 18793* ILL.

INDIANA (1896). Indefinite locality: *E. R. Drew* UC. Johnson: *H. M. Clarke* IND, WIS. Lake: *W. S. Moffatt 468* WIS, *504* ILL. *L. M. Umbach* WIS, *857* WIS, *977* US, *1553* WIS.

IOWA (1877). Adams: *M. J. Fay 4315* IA, WIS. Audubon: *B. Shimek* IA. Boone: *Anonymous* ISC; *L. H. Pammel* ISC, TENN. Buena Vista: *W. F. Couch 103* ISC; *J. D. Sauer 1693* WIS; *B. Shimek* IA. Butler: *J. D. Sauer 1697* WIS. Calhoun: *B. Shimek* IA. Carroll: *M. J. Fay 3997* IA, *4007* IA, WIS, *5346* IA. Cass: *M. J. Fay 3436* IA. Cerro Gordo: *Pammel & McNider 1093* ISC. Clay: *A. Hayden 4007* GH, ISC, MIN, MO, US, *4008* ISC, US, *7180* ISC, *7469* ISC; *B. Shimek* IA. Decatur: *J. P. Anderson* ISC, MO, RM. Dickinson: *H. S. Conard* TENN;

R. I. Cratty ISC; *B. Shimek* IA. EMMET: *F. W. Paige* ISC; *B. O. Wolden 727* ISC. FREMONT: *M. J. Fay 4132* IA, *4140* IA, WIS, *4570* IA, *4576* IA, *5554* IA. GREENE: *J. D. Sauer 1677* WIS; *B. Shimek* IA. GUTHRIE: *M. J. Fay 2117* IA, *4185* IA, WIS, *5326* IA. HAMILTON: *A. Hayden 10329* GH, ISC; *L. H. Pammel* ISC. HARRISON: *M. J. Fay 3707* IA, WIS, *3721A* IA; *B. Shimek* IA. JEFFERSON: *McDonald & Gilly 2122* ISC. JOHNSON: *M. P. Somes 4401* ISC. KOSSUTH: *J. C. Blumer 4421* ISC; *R. I. Cratty* ISC; *Pammel & Cratty* ISC. LEE: *J. L. Fults 1624* (in part) ISC; *L. H. Pammel* MICH; *B. Shimek* IA. LYON: *L. H. Pammel* ISC; *B. Shimek* IA, ISC. MADISON: *Blosser & Blosser 162* ISC; *M. J. Fay 4999* IA. MAHASKA: *D. W. Augustine 437* ISC, *465* ISC, *466* ISC. MARSHALL: *F. C. Stewart* ISC. MILLS: *M. J. Fay 3571* IA. O'BRIEN: *B. Shimek* IA. PAGE: *M. J. Fay 3794* IA, *4179* IA, WIS; *L. H. Pammel* ISC. PALO ALTO: *A. Hayden 4009* GH, MO, *4010* ISC, *7181* ISC, *7182* ISC. PLYMOUTH: *M. E. Jones* POM. POCAHONTAS: *J. D. Sauer 1695* WIS. POLK: *E. Anderson* WIS; *L. H. Pammel* ISC; *Pammel, Frankel, & Rieman 1001* GH, ISC; *B. Shimek* IA. POTTAWATTAMIE: *W. Cleburne* NEB; *F. Eastman 442* NEB. SAC: *B. Shimek* IA, ISC. SCOTT: *M. P. Somes 3661* US. STORY: *C. E. Bessey* FLAS, ISC, UTC; *R. Burgess* ISC; *G. W. Carver* ISC, MO; *R. I. Cratty* ISC; *A. Hayden 462* ISC; *D. Isely 3932* SMU; *C. C. Lorensberry* ISC; *C. E. Maxwell* ISC; *L. H. Pammel* ISC; *J. W. Parsons* ISC; *J. D. Sauer 1675* WIS. TAMA: *S. Rouse* ISC. TAYLOR: *M. J. Fay 3789* IA. VAN BUREN: *J. Fults* ISC; *M. McDonald 1170* ISC, *1194* ISC; *L. H. Pammel* ISC. WAPELLO: *L. H. Pammel* ISC. WARREN: *L. H. Pammel* ISC. WEBSTER: *D. W. Augustine 708* ISC; *J. C. Blumer 4454* ISC. WINNEBAGO: *B. Shimek* IA. WRIGHT: *R. B. Moorman* ISC; *B. Shimek* IA.

KANSAS (1847). Indefinite locality: *G. R. Kleeberger* CAS; *E. A. Popinoe* US. ALLEN: *A. S. Hitchcock* KSC. ANDERSON: *A. S. Hitchcock* KSC. ATCHISON: *A. S. Hitchcock* KSC. BOURBON: *A. S. Hitchcock* KSC. BROWN: *Clothier & Whitford* KSC. CHASE: *F. E. Bray* KSC. CHAUTAUQUA: *A. S. Hitchcock* KSC. CHEROKEE: *Clothier & Whitford* KSC; *A. A. Jacobs* KSC. CLAY: *W. A. Kellerman* KSC. CLOUD: *S. V. Fraser* KSC, *674* KSC. COFFEY: *Clothier & Whitford* KSC. COWLEY: *A. S. Hitchcock* KSC. CRAWFORD: *Clothier & Whitford* KSC. DECATUR: *J. D. Sauer 1686* WIS. DICKINSON: *J. B. S. Norton* KSC. DONIPHAN: *Clothier & Whitford* KSC. DOUGLAS: *W. A. Kellerman* KSC; *R. L. McGregor 562* KSC, *732* KSC; *A. M. Philips* DUKE; *W. C. Stevens* US. EDWARDS: *A. Finch* KSC. ELK: *Clothier & Whitford* KSC. ELLSWORTH: *M. Becker* KSC. FRANKLIN: *A. S. Hitchcock* KSC; *A. M. Philips* TEX. GEARY: *F. C. Gates 18695* MO, *19978* KSC, NEB. GREENWOOD: *A. S. Hitchcock* KSC. HARVEY: *Clothier & Whitford* KSC. JACKSON: *M. Reed* KSC. JEFFERSON: *G. L. Clothier* KSC. JOHNSON: *H. L. Pellet* KSC. KINGMAN: *A. S. Hitchcock* KSC. LABETTE: *A. S. Hitchcock* KSC. LINCOLN: *A. S. Hitchcock* KSC. LINN: *A. S. Hitchcock* KSC. LYON: *A. M. Philips* TEX, US. MARION: *A. S. Hitchcock* KSC. MARSHALL: *A. S. Hitchcock* KSC. MCPHERSON: *J. E. Bodin* MIN; *A. S. Hitchcock* KSC. MONTGOMERY: *A. S. Hitchcock* KSC. MORRIS: *A. Fendler 737* GH, MO; *A. S. Hitchcock* KSC. NEMAHA: *A. S. Hitchcock* KSC. NEOSHO: *F. Broadbent* KSC. NESS: *A. S. Hitchcock* KSC. NORTON: *J. D. Sauer 1685* WIS. OSAGE: *Z. D. Brown* KSC. OSBORNE: *C. L. Shear 211* (in part) NDA, RM. POTTAWATOMIE: *F. C. Gates 16301* KSC, MO; *H. H. Laude* MO; *Norton, Clothier & Pond* KSC. REPUBLIC: *D. K. Thomas* KSC. RICE: *A. S. Hitchcock* KSC. RILEY: *S. J. Adams* KSC; *W. T. Allen* US; *H. F. Bergman* NDA; *F. C. Gates 12749* MT, *13656* OC; *A. S. Hitchcock* KSC, *349* GH; *W. A. Kellerman* KSC, MO; *J. B. S. Norton* KSC, MO, WIS, *428* GH, KSC, MO, NMC, RM, US; *D. Otis* KSC; *A. W. Staver* KSC; *J. Walquist* KSC. RUSSELL: *A. S. Hitchcock* KSC. SALINE: *J. Hancin 617* KSC, *696* KSC, *700* KSC, *2197* MO, *2199* WIS, *2200* WIS, *2203* MO, *2205* MO, *2211* MO; *J. B. S. Norton* KSC; *M. Reed* KSC; *H. W. Ryding 10* US. SEDGWICK: *T. L. Andrews* ISC; *A. S. Hitchcock* KSC; *S. F. Poole 16* GH, *17* GH. SHAWNEE: *Harper & Harper* CU; *J. Lockhart* KSC; *R. B. Smyth 1403* KSC. SUMNER: *Clothier & Whitford* KSC; *A. S. Hitchcock* KSC. WABAUNSEE: *Norton & Clothier* KSC. WASHINGTON: *F. E. Gwin* KSC. WILSON: *W. H. Haller* KSC. WOODSON: *Clothier & Whitford* KSC. WYANDOTTE: *K. K. Mackenzie* KSC.

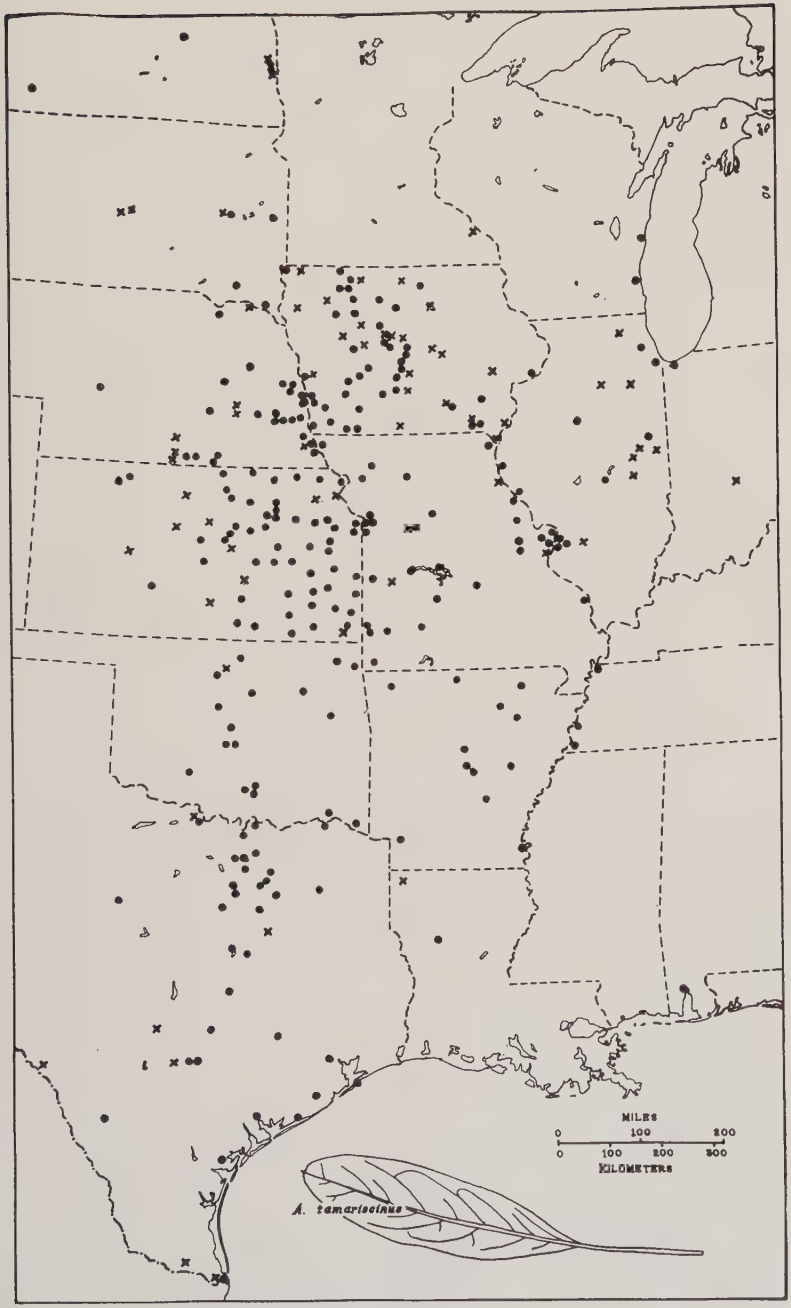

FIG. 7. *Amaranthus tamariscinus:* distribution map. Atypical plants indicated by crosses.

LOUISIANA (1952). Caddo: *G. Ware* WIS. Natchitoches: *G. Ware* NO, TEX, WIS.

*MAINE (1906). Penobscot: *O. W. Knight 5257* GH, US.

*MASSACHUSETTS (1882). Middlesex: *F. S. Collins* GH, MIN, MO. Suffolk: *C. E. Perkins* MIN.

MINNESOTA (1943). Winona: *Moore & Neva 16160* MIN.

MISSOURI (1841). Atchison: *B. F. Bush* MO. Bates: *F. P. Metcalf 986* US. Clark: *F. Drouet 1723* GH; *S. B. Mead* ILL; *L. H. Pammel* ISC. Dallas: *J. A. Steyermark 13724* MO. Dekalb: *E. J. Palmer 43749* MO. Franklin: *J. D. Sauer 1614* NO, WIS. Gentry: *J. A. Steyermark 14968* MO. Greene: *P. C. Standley 8652* US, *9091* US. Jackson: *B. F. Bush 12* US, *50* MO, *220* MO, US, *224* WIS, *227* KSC, MO, *313* GH, MO, *399* WIS, *444* MIN, MO, *446* MO, *516* MIN, MO, *1909* GH, MO, UC, US, *8175* ILL, MO, US, *8803* MO, *8845* WIS, *8878* ILL, UC, US, *13781* WIS; *F. Bush 8* MO; *R. Hoffman* MO, WIS; *K. K. Mackenzie* ISC, KSC, MIN, RM. Jasper: *D. Demaree 4412* UARK; *E. J. Palmer 425* MO, *1302* MO, WIS. *1560* MO. Jefferson: *J. A. Steyermark 8287* MO. Lafayette: *Kluhsmann & Trusik 36* COLO, OKL, RM, TEX; *Trusik & Busch 11* TEX. Lincoln: *J. D. Sauer 1615* NO, WIS; *J. A. Steyermark 8938* MO. Livingston: *S. Sparling 342* ISC, *539* ISC. McDonald: *B. F. Bush 15773* MO, NEB. Morgan: *J. A. Steyermark 13154* MO. Perry: *J. A. Steyermark 14062* MO. Phelps: *J. H. Kellogg 192* MO, WIS. Pike: *J. D. Sauer 1617* NO, WIS. Ralls: *J. A. Steyermark 25808* MO. Saint Clair: *J. A. Steyermark 7598* MO, *24320* MO. Saint Louis: *G. Engelmann* MO; *N. M. Glatfelter* US; *J. H. Kellogg 885* MO; *O. S. Ledman 9* MO; *E. Mische* MO; *J. B. S. Norton* MO, WIS; *J. A. Steyermark 513A* MO, *514* MO, *8869* MO, *8901* MO, *8902* MO, *8905* WIS, *8970* WIS, *8992* MO, US, *8996* WIS, *9020* MO. Saline: *J. A. Steyermark 9342* MO, WIS, *9360* MO, *9361* WIS, *9375* MO, *9389* MO, US, *14811* MO. Warren: *J. D. Sauer 1611* WIS.

NEBRASKA (1860). Indefinite locality: *W. C. Knight* NEB, RM. Cass: *T. A. Williams* SDC, US. Cedar: *T. A. Bruhin* GH. Dodge: *J. M. Bates 1569* (in part) NEB; *G. C. Engberg* NEB; *W. Kiener 17734* GH; *J. D. Sauer 1678* WIS. Douglas: *W. Cleburne* NEB; *M. R. Gilmore* MICH; *Wiegand & Castle 825* CU. Franklin: *H. Hapeman* DUKE, RM; *J. D. Sauer 1683B* WIS. Hall: *J. D. Sauer 1679* WIS. Hamilton: *W. Kiener 15047* GH. Kearney: *H. Hapeman* OC. Knox: *F. Clements 2755* (in part) NEB. Lancaster: *J. M. Bates 4399* GH, NEB; *U. G. Cornell* NEB; *W. Kiener 16989* GH; *J. W. Morrow* WIS; *J. L. Sheldon* WVA; *J. G. Smith* NEB; *M. P. Somes* ISC; *O. E. Sperry* NEB; *C. A. Turrell* ARIZ; *H. J. Webber* MO, NEB, *5325* NEB. Lincoln: *F. Eastman 1464* RM. Nemaha: *J. M. Bates 3291* NEB; *W. W. Hansen* MICH; *J. M. Winter 447* OC. Nuckolls: *G. G. Hedgcock* MO, WIS; *W. L. Tolstead* NEB. Otoe: *Anonymous* NEB; *G. G. Hedgcock* MO. Platte: *J. D. Sauer 1692* WIS. Polk: *E. A. Boostrom* NEB. Sarpy: *W. Cleburne* NEB. Seward: *W. Kiener 17087* MO. Webster: *J. M. Bates* GH, NEB, *3122* NEB, *3124* GH, NEB; *W. L. Tolstead* NEB. York: *W. Kiener 17840* GH.

*NEW JERSEY (1879). Hudson: *A. Brown* US.

*NEW MEXICO (1907). Roosevelt: *A. D. Stowell* NMC.

*NEW YORK (1924). Tompkins: *S. H. Burnham 17854* CU, *19860* CU; *Burnham & DeFrance 16950* CU, MO; *W. C. Muenscher 15457* CU; *C. L. Pratt 18521* CU.

NORTH DAKOTA (1890). Cass: *H. F. Bergman* KSC; *O. A. Stevens* CAS, NDA, OC, RM, *753* GH, MO, NDA, US; *L. R. Waldron 1306* NDA. Foster: *W. P. MacDonald* NDA. Slope: *O. A. Stevens* NDA.

*OHIO (1871). Lake: *H. C. Beardslee* OS.

OKLAHOMA (1874). Indefinite locality: *E. DeBarr 286* MSC; *E. Palmer 277* MO. Choctaw: *Hopkins & Cross 2270* OKL. Cleveland: *W. H. Emig 385* US; *M. Hopkins 778* OKL, *779* OKL, *29270* OKL; *R. E. Jeffs* OKL, WIS; *Perkinson* OKL. Comanche: *Mrs. J. Clemens 11560* GH, MO, OKL. Craig: *J. T. Monell* MO. Delaware: *R. Bebb 3698* OKL; *B. F. Bush 15788* MO. Garfield: *H. B. Gephardt 564* US, *696* OKL, *1115* US. Kay: *G. W. Stevens 1845* GH, ILL, MIN, OKL. Kingfisher: *R. Bollenbach 99* OKL, *106* OKL. McCurtain: *U. T. Waterfall 9829* SMU. Murray:

M. Hopkins 2023 OKL; *Hopkins & Demaree 22* OKL; *Hopkins & Van Valkenburgh 5424* OKL, *5474* OKL; *Merrill & Hagan 821* TENN; *G. T. Robbins 2728* OKL. MUSKOGEE: *R. Bebb 4994* GH, OKL; *E. L. Little, Jr. 2064* OKL, *2067* OKL, *2717* OKL, *2804* OKL. OKLAHOMA: *D. Demaree 13272* GH, MO, *13273* OKL; *B. Shimek* IA; *U. T. Waterfall 3560* OKL; *S. S. White 1148* GH, *1181* GH. PAYNE: *C. R. Atkins 16* SMU; *J. W. Blankinship* GH; *K. Bradley 20* TEX; *M. Cox 61* MO; *J. M. Dyer 87* ARIZ, COLO; *J. H. Kimmons* GH, MO, US; *R. E. Penn 64* WVA; *N. R. Poteat 61* OKL; *I. Sooter 90* TEX; *F. A. Waugh 162* KSC, *167* MO. TULSA: *R. Luckhardt 160* OKL. WAGONER: *G. Ware* WIS.

*PENNSYLVANIA (1908). CHESTER: *J. J. Carter* MT.

SOUTH DAKOTA (1891). BEADLE: *J. J. Thornber* SDC. BROOKINGS: *Anonymous* SDC; *M. Folds* FLAS. CLAY: *W. H. Over 5137* US; *S. S. Visher 4111* MO. HUGHES: *F. H. Sargent* NDA. KINGSBURY: *J. J. Thornber* MO, SDC, UC, WIS, WVA. STANLEY: *T. A. Williams 33* US. YANKTON: *L. A. Bruce 65* US.

TENNESSEE (1922). KNOX: *A. R. Bechtel* CU, *10868* CU. LAKE: *R. E. Shanks 13693* TENN. SHELBY: *D. Demaree 19675* MO, *19723* MO. TIPTON: *Sharp, Fairchild & Clebsch 8067* TENN.

TEXAS (1845). Indefinite locality: *T. Drummond 240* (in part) GH. BELL: *B. Mackensen 238* MO. BEXAR: *F. Lindheimer 142* GH, MIN, MO, US, WIS. BRAZORIA: *B. F. Bush 1562* MO. CAMERON: *Bogusch & Molby 4190* ILL; *R. Runyon 29* US, *4245* SMU, *4246* ARIZ, SMU, TEX. CLAY: *V. L. Cory 40741* GH; *L. H. Shinners 12866* SMU, *12873* SMU. COLLIN: *L. H. Shinners 11712* SMU. COMAL: *F. Lindheimer* MO, SMU, *285B* GH, MO, *456* GH, MO. COOKE: *E. Whitehouse 19262* SMU, UC, US. DALLAS: *H. Eggert* MO; *H. L. Graham* ISC; *M. Hynes* TEX; *G. Letterman* US, *93* WIS; *C. L. Lundell 11653* GH, SMU; *Lundell & Lundell 9656* GH, MICH, SMU; *J. Reverchon* GH, *829* MO, US; *L. H. Shinners 10367* SMU; *R. Van Vleet 334* SMU. DENTON: *Anonymous* TEX; *L. H. Shinners 9395* SMU, *11894* SMU; *E. Whitehouse 17426* SMU. ELLIS: *L. H. Shinners 16727* SMU. GALVESTON: *G. L. Fisher* UC, WIS, *613* US, *2066* US. GILLESPIE: *F. Lindheimer 54* GH, MO. GRAYSON: *E. Whitehouse 17451* SMU, UC. HARRIS: *G. L. Fisher* WIS. HIDALGO: *V. L. Cory* TEX. HOOD: *L. H. Shinners 19089* SMU. JACKSON: *B. C. Tharp* GH. KAUFMAN: *V. L. Cory 52551* SMU. LAMAR: *G. Ware* WIS. MATAGORDA: *V. L. Cory 11530* GH; *B. C. Tharp 1593* TEX, US, *1594* TEX. MCLENNAN: *L. D. Smith 235* TEX, *268* TEX; *C. L. York 46252* TEX; *York & Smith 149* TEX. NAVARRO: *J. F. Joor* MO, US. SAN PATRICIO: *F. B. Jones 352* SMU. TARRANT: *G. W. Letterman 100* GH, MO; *A. Ruth 233* CM, GH, ILL, MIN, SMU, US, WIS, *710* US, *1043* CU, GH, ISC, NDA, US; *L. F. Ward* US. TAYLOR: *W. L. Tolstead* SMU, *7734* GH. TRAVIS: *A. A. Armer 5387* TEX, US; *J. E. Bodin 245* US; *A. M. Ferguson 458* TEX; *R. H. Painter 78* KSC; *B. C. Tharp* MICH, *892* TEX, US, *1276* TEX, US, *1388* TEX, US, *1501* TEX, US; *Tharp & Barkley 15558* TEX; *M. S. Young* TEX. VALVERDE: *C. Wright 582* (in part) GH, *1747* GH, US. WASHINGTON: *E. Brackett* GH. WOOD: *E. Whitehouse 16482* SMU. ZAVALA: *H. R. Reed* GH.

*WASHINGTON (1895). KLICKITAT: *W. N. Suksdorf 3676* GH.

WISCONSIN (1914). MILWAUKEE: *H. P. Sartwell* GH. SHEBOYGAN: *C. Goessl* WIS.

6. AMARANTHUS PALMERI S. Wats. Proc. Am. Acad. 12:274. 1877. *Amaranthus Palmeri* S. Wats. var. *glomeratus* Uline & Bray, Bot. Gaz. 19:272. 1894 (*pro parte*).

Watson described this species from pistillate plants and gave no definite citations of staminate specimens (syntypes: *J. L. Berlandier 2407,* banks of Rio Grande, July, 1834, GH!, here designated as lectotype; also in MO!, US!; *Dr. Edward Palmer 323,* Larkin's Station, San Diego County, California, 1875, GH!, MO!). However, in both the original description

and in a later publication Watson (1880, p. 42) suggested that certain staminate collections might represent the same species (*Edward Palmer s.n.,* 80 miles east of San Diego on Fort Yuma road, August, 1875, GH!; *L.J. Xantus 100,* Cape San Lucas, Baja California, 1859–60, GH!, US!). It is fortunate that Watson did not cite the Xantus specimen as representative of his species, because it does not belong to the same taxon as the other specimens and has served as the type of various other taxa to be discussed below. The Berlandier specimen is an ideal representative of the species under consideration here; the Palmer specimens, although well within the limits of the species, are less typical and may show traces of mixing with *A. Watsoni.* The variety *glomeratus* is based on two specimens (syntypes: *Edward Palmer 953,* caespitose form producing great mats in dry places, river bottom, Colonia Lerdo, Sonora, April 26, 1889, ♀ GH!, MICH!, US!; *958,* same place and date. ♂ GH!, US!), the pistillate plants being here assigned to *A. Palmeri* and the staminate to *A. Watsoni,* although both are probably from a hybrid swarm of the two species.

Plants stout and erect with ascending branches, usually about 1 m. but occasionally 2 or 3 m. tall; leaf-blade rhomboid-lanceolate, petiole strikingly long, about equalling blade; flowering and fruiting mainly in summer and fall but occasional individuals flower in all months in the United States border states and in Mexico; thyrses flexible or moderately stiff, usually 20 to 30 cm. long, either all terminal on leafy branches or, if leafless branch thyrses present, these loosely arranged and each subtended by a leaf; bract usually 4 to 6 mm. long; midrib excurrent, moderately heavy in ♂, very heavy in ♀; ♂ flowers with 5 stamens, 5 tepals, the inner tepals 2½ to 3 mm. long, obtuse or emarginate, the outer tepals 3½ to 4 mm. long, acuminate, with conspicuous, long-excurrent midveins; ♀ flowers with 5 recurved tepals, each with conspicuous, branched midvein, the inner tepals usually 2 to 2½ mm. long, spatulate, emarginate, slightly denticulate, the outer usually 3 to 4 mm. long, acute, with midvein excurrent as rigid point; utricle 1½ to 2 mm. long, circumscissile, thin, somewhat rugose; style branches usually 2, sometimes 3; seeds 1 to 1¼ mm. in diameter, obovate, lenticular, dark reddish brown.

The species is at home along permanent or intermittent streams. About one-third of the collections bear such notations as: creek bank, river floodplain, canyon bottom, arroyo floor, edge of marsh, by spring. In such places it commonly grows in silt as well as in sandy and gravelly soil. This is probably the weediest of all the dioecious amaranths and the only one in which collections from natural habitats are outnumbered by collections from artificial habitats: irrigation ditches, roadsides, railroads, dumps, fields, and gardens. Such sites are reported for almost all collections made on the margins or outside the coherent range of the species as well as for more than half of the collections from the heart of the range. The species shares various common names with the weedy monoecious species: pigweed, careless weed, redroot in the United States, *quelite* and *bledo* in Mexico. *Amaranthus Palmeri* has been an important food plant, both as a

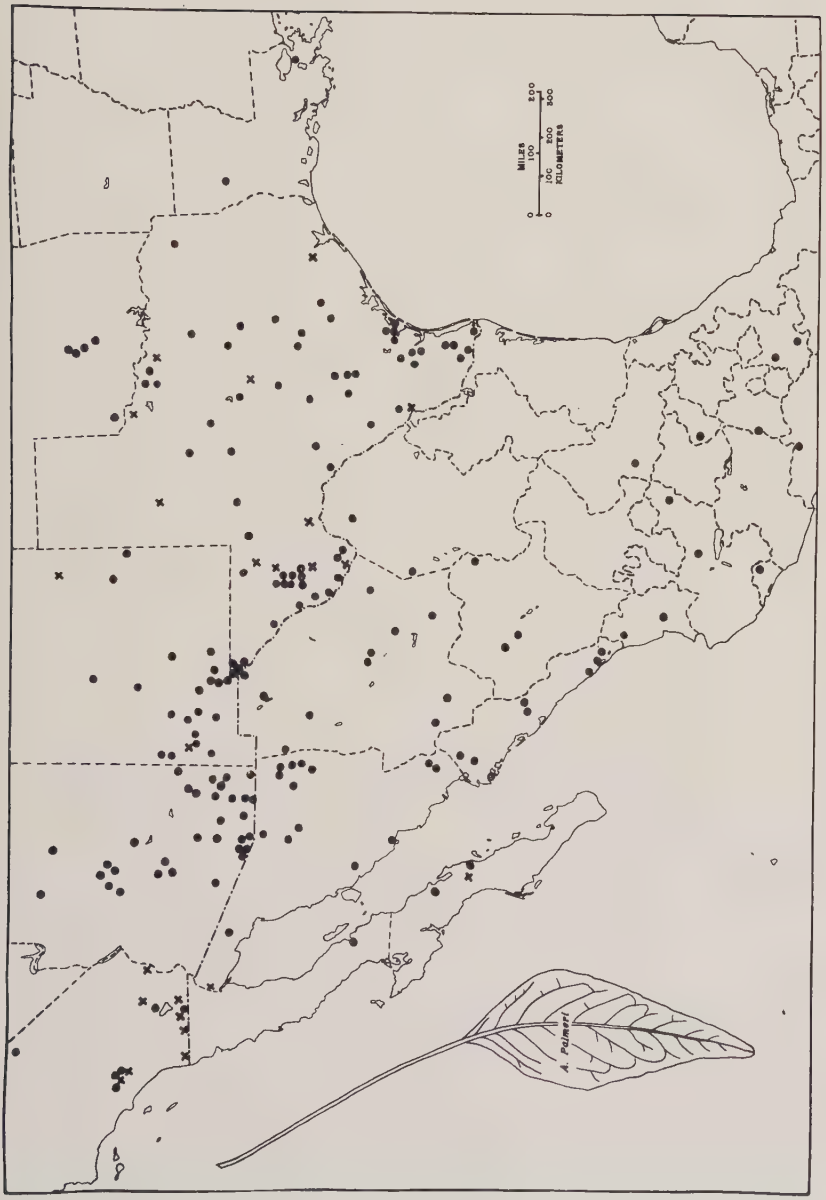

FIG. 8. *Amaranthus Palmeri;* distribution map. Atypical plants indicated by crosses.

potherb and as a source of grain, for various Indian tribes: Mojave and Chemehuevi of Arizona (*I. T. Kelly s.n.*, CAS!), Papago of Arizona (Castetter and Bell, 1942, pp. 61–62), Cocopa of Sonora (*E. Palmer s.n.*, US!; Castetter and Bell, 1951, p. 189), Tarahumare of Chihuahua (*C. V. Hartmann 567*, GH!), and others (Watson, 1889, p. 71). There is no evidence that the species has ever been systematically cultivated, although it may have been spread unintentionally by seed gathering.

MEXICO. BAJA CALIFORNIA (1887). Comondu: *Carter & Kellogg 3099* UC, WIS, *3100* UC, WIS; *B. J. Hammerly 171* CAS, GH. Ensenada: *E. Palmer* ARIZ, CAS, COLO, CU, FLAS, GH, ILL, KSC, MIN, MO, MSC, NEB, NMC, OC, POM, RM, SDC, TEX, UC, UTC, WIS. Mulegé: *H. Aschmann* WIS.

CHIHUAHUA (1885). Aquiles Serdan: *E. H. Wilkinson* ISC, OC, UC, US. Ascension: *E. W. Nelson 6420* GH, US. Batopilas: *C. V. Hartman 567* GH; *E. Palmer V* GH, US. Chihuahua: *E. Palmer 203* US, *350* US; *C. G. Pringle 1112* MIN, US. Galeana: *J. D. Sauer 1000* MO. Janos: *E. A. Mearns 320* US; *S. S. White 1102* GH, *1113* GH, MICH, *2519* ARIZ, MICH. Jimenez: *S. S. White 2096* MICH. Juarez: *B. Shimek* IA. Manuel Benavides: *I. M. Johnston 7972A* GH. Saucillo: *S. S. White 2288* GH, MICH.

COAHUILA (1940). Sierra Mojada: *Johnston & Muller 1050* GH, *1252* GH.

COLIMA (1897). Colima: *E. Palmer 152* US.

DURANGO (1896). Santiago Papasquiaro: *E. Palmer 428* GH, MO, UC, US. Tepehuanes: *G. L. Fisher 44234* GH. MO. Tlahualillo de Zaragoza: *H. Pittier 510* US.

GUERRERO (1934). Coyuca de Catalan: *G. B. Hinton 5532* GH, MO.

JALISCO (1886). Guadalajara: *E. Palmer 624* GH, *627* US, *628* GH, MICH, US; *C. G. Pringle 11314* GH, US. Lagos de Moreno: *C. O. Sauer 15* MO.

MEXICO (1932). Temascaltepec: *G. B. Hinton 2482* GH, US.

NAYARIT (1892). Acaponeta: *J. N. Rose 3127* US. Tepic: *M. E. Jones 23291* MO; *E. Palmer* US.

PUEBLA (1947). Acatlan: *J. D. Sauer 1143* WIS. Huaquechula: *J. D. Sauer 1135* WIS.

QUERETARO (1913). Queretaro: *Bros. Arsene & Agniel 10543* US.

SAN LUIS POTOSI (1876). San Luis Potosi: *L. de la Rosa 1010* ILL; *Parry & Palmer 786* (in part) GH, MO, US; *J. G. Schaffner 885* GH, *886* (in part) GH; *L. F. Ward* US.

SINALOA (1891). Indefinite locality: *J. G. Ortega 4211* US. Ahome: *E. Palmer 190* ARIZ, MICH, UC, US; *Rose, Standley, & Russell 13347* US. Culiacan: *T. S. Brandegee* UC; *H. S. Gentry 4939* ARIZ, MICH, MO, UC; *E. Palmer 1721* GH, US; *Rose, Standley, & Russell 14980* US. Del Fuerte: *Rose, Standley, & Russell 13416* US, *13595* US. Mazatlan: *Rose, Standley, & Russell 14042A* US. Rosario: *Ferris & Mexia 5079* GH; *J. N. Rose 1823* GH, US.

SONORA (1869). Indefinite locality: *C. Lumholtz 40* GH; *E. Palmer* US. Agua Prieta: *S. S. White 4107* GH. Alamos: *H. S. Gentry 4851* ARIZ, GH, MICH, MO; *Rose, Standley, & Russell 12665* US, *13031* US. Bacerac: *S. S. White 2731* GH, MICH, *3807* GH. Bavispe: *S. S. White 447* GH, *762* ARIZ, GH, MICH, *2889* ARIZ, GH, MICH. Caborca: *E. Palmer 953* GH, MICH, US; *G. Sykes* US, *24* US. Cucurpe: *I. L. Wiggins 7164* GH, MICH, US. Guaymas: *E. Palmer* US, *76* GH, *77* ARIZ, US, *78* MICH, US, *120* ARIZ, *127* GH, US, *128* US, *129* US, *130* US, *131* US, *132* US, *133* US, *134* GH, US, *688* ARIZ, GH, MICH, MO, UC, US. Hermosillo: *Wiggins & Rollins 148* GH, MICH, MO, UC, US. Magdalena: *W. B. Kibbey 7052* US. Nacozari de Garcia: *S. S. White 3962* GH. Nogales: *D. Griffiths 6753* MO.

UNITED STATES. ARIZONA (1865). Indefinite locality: *W. W. Jones* UC; *O. Loew* US; *E. Palmer* US; *C. G. Pringle* US; *C. Smart* GH, US. COCHISE: *J. C. Blumer 1594* ARIZ, GH, ISC, KSC, MIN, MO, NEB, NMC, RM, US; *C. B. Carter* ARIZ; *O. M. Clark 8613* ARIZ; *D. Griffiths 1585* ARIZ; *M. E. Jones 4224* MSC, OC, POM, US, UTC; *J. G. Lemmon 465* GH, *2878* GH; *E. A. Mearns 599* US, *625* US, *629* US, *664* US, *809* US, *810* US, *1096* US, *2006* US; *J. J. Thornber* ARIZ. COCONINO: *E. U. Clover 5075* SMU; *Eastwood & Howell 6978* CAS; *J. T. Howell 26562* ARIZ, CAS. GILA: *J. W. Toumey 427* US. GRAHAM: *R. H. Peebles 14508* US; *J. T. Rothrock 379* GH, US. GREENLEE: *A. Davidson* UC. MARICOPA: *J. B. Feudge 2077* POM; *J. J. Thornber* ARIZ; *S. E. Wolff 1847* US. PIMA: *J. J. Carlson* CAS; *R. Darrow* GH; *L. H. Dewey* US; *G. Engelmann* MO; *H. S. Gentry 5963* CAS; *F. W. Gould 2901* (in part) ARIZ; *H. W. Graham* CM; *D. Griffiths 5897* US, *5920* US, *5927* US; *J. A. Harris C16556* MIN; *M. E. Jones* POM; *C. D. Marsh* US; *K. F. Parker 8053* ARIZ; *A. R. Phillips 10* FLAG; *C. G. Pringle* CINC, CM, GH, MO; *F. Shreve 4908* MICH; *Sister Thomas-Marie 477* CM, RM; *J. J. Thornber* ARIZ, *201* MIN, MO, NMC, POM, UC, *2543* ARIZ; *J. W. Toumey* ARIZ, GH, UC, US; *L. C. Whitehead* ARIZ; *W. F. Wickham* IA; *I. L. Wiggins 6992* MO, US. PINAL: *R. H. Peebles 10011* CAS, UC, *10593* POM; *J. J. Thornber* ARIZ. SANTA CRUZ: *Darrow & Haskell 2006* ARIZ; *D. Griffiths 6134* MO, US; *M. E. Jones 22639* MO; *Peebles, Harrison, & Kearney 5578* US; *J. J. Thornber* ARIZ. YAVAPAI: *Coues & Palmer 169* MO, *568* MO; *E. Jackson* ARIZ; *W. W. Jones* UC, *249* GH; *D. McDougal* US; *J. D. Sauer 1661* WIS, *1662* WIS. YUMA: *A. Beard* MO; *I. T. Kelly* CAS; *Twist & Kelly 7* GH.

CALIFORNIA (1875). Indefinite locality: *E. E. Schellenger 84* UC. IMPERIAL: *Macbride & Drouet 4510* KSC; *R. McKee 13* US; *E. Palmer* GH; *S. B. Parish 8269* GH; *C. B. Wolf 2280* CAS, GH, POM, UC, *4336* COLO, UC. INYO: *M. F. Gilman 4310* POM. LOS ANGELES: *L. C. Wheeler 1355* NO, POM, *1418* UC, *2102* CAS, POM. RIVERSIDE: *H. M. Hall 8009* UC; *L. S. Rose 36825* CAS; *J. D. Sauer 1668* WIS. SAN BERNARDINO: *I. M. Johnston* GH, POM, RM; *S. B. Parish 10971* ARIZ, MIN, POM, UC; *F. M. Reed 3683* RM, MO, UC; *J. Roos 1895* POM. SAN DIEGO: *E. A. Mearns 2965* US; *C. R. Orcutt 2066* US; *E. Palmer 323* GH, MO. *STANISLAUS: *R. F. Hoover 697* UC.

*ILLINOIS (1896). COOK: *A. Chase* ILL.

*KANSAS (1895). WYANDOTTE: *K. K. Mackenzie* KSC, MO.

LOUISIANA (1929). NATCHITOCHES: *G. Ware* TEX, WIS. ORLEANS: *J. J. Morrison* NO, WIS.

*MISSOURI (1897). JACKSON: *B. F. Bush 200* GH, MIN, MO, UC, US, *8798* CAS, GH, ILL, MIN, MO, RM, US, *8800* GH, ILL, POM, US, *8877* CAS, GH, ILL, MIN, US, *9213* ILL, MIN, UC, *9475* ILL, MIN; *O. C. Durham 73* FLAS; *K. K. Mackenzie* ISC, KSC, MIN, MO.

NEW MEXICO (1881). Indefinite locality: *E. O. Wooton 2727* US. BERNALILLO: *Rose & Fitch 17798* US. CATRON: *E. A. Goldman 1579* US; *E. O. Wooton* US. CURRY: *H. C. Reynolds 276* NEB. DONA ANA: *J. H. Bruce* NMC; *D. B. Dunn 8568* ARIZ, CAS, COLO, DUKE, FLAS, IA, IND, MT, NCU, NDA, NMC, NO, OC, SDC, TENN, UARK, WIS; *P. C. Standley 444* MO, US; *G. R. Vasey* US; *E. O. Wooton* ARIZ, KSC, NMC, POM, RM, UC, US, *82* CAS, GH, ILL, KSC, MO, NMC, POM, RM, UC, US; *Wooton & Standley* US, *3223* MIN, RM, WIS. GRANT: *C. N. Barney* NMC; *O. B. Metcalfe* US, *719* ARIZ, MIN, MO, NMC, RM, US, *721* ARIZ, GH, MIN, MO, US; *J. G. Smith* US. HARDING: *H. M. Hanson* NMC. HIDALGO: *E. A. Mearns 2410* US; *M. J. Murray* CU, WIS. LUNA: *D. Griffiths 3333* US; *H. T. Henson* NMC; *M. E. Jones* POM; *A. I. Mulford 1029* MO. OTERO: *W. C. Alsdorf* NMC; *F. G. Plummer* US. QUAY: *D. D. Suggs* NMC. SIERRA: *Mrs. W. G. Beals 4* NMC; *E. F. Holmes* NMC; *O. B. Metcalfe 1365* (in part) CAS, US, *1385* CAS, GH, MIN, MO, MT, POM. SOCORRO: *C. L. Herrick 683* US; *G. R. Vasey* GH, US.

*NEW YORK (1936). QUEENS: *J. Monachino 195* CU, TENN.

OKLAHOMA (1926). Cleveland: *E. L. Little, Jr. 403* OKL. Jackson: *M. Hopkins 874* OKL. McClain: *M. Hopkins 33* OKL. Oklahoma: *U. T. Waterfall 1637* OKL, *1779* OKL, *2337* GH.

*PENNSYLVANIA (1933). Delaware: *L. C. Wheeler 5560* GH. Philadelphia: *T. O'Neill* GH.

TEXAS (1834). Indefinite locality: *J. L. Berlandier 977* GH, *2407* GH, MO, US. Archer: *L. H. Shinners 15868* SMU. Atascosa: *E. J. Palmer 12920* GH, MO; *H. B. Parks 20788* GH; *L. H. Shinners 16917* SMU. Bastrop: *H. H. Duval* TEX; *R. Mauermann 34* TEX. Bexar: *C. R. Ball 914* US; *R. D. Burr 317* TEX; *Mrs. J. Clemens 190* MO, POM; *H. Eggert* MO; *G. Jermy* MO; *E. H. Wilkinson* MO. Bosque: *L. H. Shinners 15284* SMU. Brewster: *V. L. Cory 26442* GH, *40344* GH; *L. H. Shinners 8831* SMU; *O. E. Sperry T875* UC, US, *T879* UC, US, *T1272* UC, US; *B. H. Warnock 347* GH, *6667* SRSC, *7197* SRSC, *8024* SRSC. Brown: *V. L. Cory 15331* GH, *15333* GH. Cameron: *Mrs. A. M. Davis* TEX; *L. H. Shinners 17760* SMU. Clay: *L. H. Shinners 12860* SMU. Coke: *V. L. Cory 37955* GH. Colorado: *B. Mackensen 208* MO. Dimmit: *V. L. Cory 29319* GH; *S. S. Ivanoff 29291* GH; *L. H. Shinners 17313* SMU, *17314* SMU. Edwards: *V. L. Cory 5245* GH, *38113* GH, *52493* RM, SMU, UC. El Paso: *B. Barlow* UC; *Mrs. J. Clemens* POM; *M. E. Jones* POM; *E. A. Mearns 1503* US; *B. Shimek* IA; *G. R. Vasey* US; *B. H. Warnock 7277* SRSC, *8192* SMU, SRSC. Fisher: *J. Brookes 41* TEX. Harris: *G. L. Fisher 276* ILL, US. Hidalgo: *Ferris & Duncan 3067* CAS, MO; *M. E. Jones* MO; *Lundell & Lundell 13337* SMU; *L. H. Shinners 17153* SMU, *17169* SMU, *17897* SMU. Hudspeth: *V. L. Cory 1488* GH; *U. T. Waterfall 6276* MO. Jeff Davis: *F. Barkley 14T798* TEX; *V. L. Cory 9397* GH, *17639* GH; *L. C. Hinckley* TEX; *B. H. Warnock 6940* SRSC, *7953* SRSC, *9228* SMU, SRSC; *M. S. Young* ILL, TEX, UC. Jim Wells: *R. Freeborn 438* TEX. Kaufman: *L. H. Shinners 15968* SMU. Kerr: *A. A. Heller 1890* ARIZ, CAS, CU, GH, IA, ILL, ISC, MICH, MIN, MO, MSC, RM, UC, US. Kleberg: *V. L. Cory 51319* SMU, TEX; *L. H. Shinners 17021* SMU, *17068* SMU; *J. F. Sinclair* GH, TEX. La Salle: *L. H. Shinners 17280* SMU. Lavaca: *G. L. Fisher 117* US. Live Oak: *L. H. Shinners 17000* SMU. Llano: *E. Whitehouse* TEX. Loving: *B. H. Warnock 10676* SMU. Lubbock: *E. L. Reed 1658* US. McLennan: *L. D. Smith 315* TEX, *825* TEX. Medina: *V. L. Cory 11676* GH. Midland: *V. L. Cory 40596* TEX, *40597* GH. Milam: *L. H. Shinners 14729* SMU. Mills: *V. L. Cory 58207* SMU, *58208* SMU; *L. H. Shinners 16837* SMU. Montague: *L. H. Shinners 12832* SMU. Morris: *V. L. Cory 56911* SMU. Nueces: *V. L. Cory 20486* GH. Presidio: *W. W. Eggleston 17295* US; *L. C. Hinckley* ARIZ, GH, *2047* GH, TEX; *T. H. Rogers* SRSC; *B. H. Warnock 94* TEX, US, *47830* SRSC; *Watts & Finger* SRSC. Reeves: *V. L. Cory 52239* SMU; *Rose & Fitch 17896* US. Refugio: *E. R. Bogusch* OC. San Patricio: *F. B. Jones 377* SMU; *Tharp & Brown 48199* TEX. Tarrant: *A. Ruth 158* MICH, *967* (in part) CU, GH, ISC, MSC, SMU, US, WIS; *E. Whitehouse 16254* SMU. Taylor: *W. L. Tolstead 7702* GH, SMU. Terrell: *W. B. Crockatt 50* NMC. Travis: *B. C. Tharp* CM, GH, MO, UC, *707* US, *1530* TEX, US, *1535* TEX, US, *1962* US; *B. H. Warnock 66* TEX; *M. S. Young* TEX. Valverde: *H. Eggert* GH, MO. Ward: *B. C. Tharp 3389* (in part) TEX. Webb: *V. L. Cory 16872* GH; *C. R. Orcutt 5720* MO; *L. H. Shinners 17225* SMU. Wichita: *L. H. Shinners 15855* SMU. Wilbarger: *E. Whitehouse 10945* (in part) SMU. Willacy: *V. L. Cory 51467* GH, SMU; *R. Runyon 2846* UC, US; *L. H. Shinners 17113* SMU.

7. Amaranthus Watsoni Standl. Bull. Torrey Club 41:505. 1914. *Amblogyne Torreyi* A. Gray, Proc. Am. Acad. 5:167. 1861. *(pro parte). Amaranthus Torreyi* (A. Gray) Benth. ex. S. Wats. Bot. Calif. 2:42. 1880. *(pro parte). Amaranthus Torreyi* (A. Gray) Benth. ex S. Wats. var. *suffruticosus* Uline & Bray, Bot. Gaz. 19:272. 1894. *Amaranthus Palmeri* S. Wats. var. *glomeratus* Uline & Bray, loc. cit. 272. 1894. *(pro parte).*

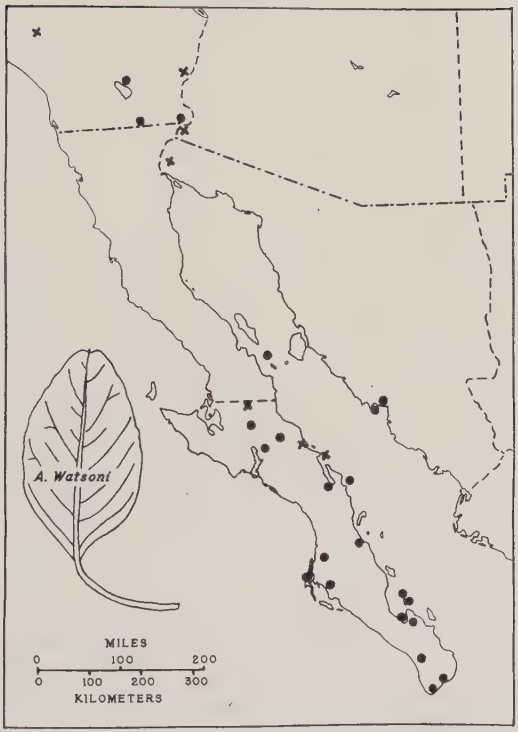

FIG. 9. *Amaranthus Watsoni:* distribution map. Atypical plants indicated by crosses.

Amblogyne Torreyi was described from a very discordant group of specimens (syntypes: *J. M. Bigelow,* Mex. Bound. Surv. *1190,* mountains of the Cibola, a tributary of the Rio Grande, W. Texas, August, 1852, US!; *C. C. Parry s.n.,* "Camp Green, New Mexico," place unlocated; *L. J. Xantus 100,* Cape San Lucas, Baja California, 1859-60, ♂ ♀ GH! ♂ US!). Gray cited another collection (*H. Engelmann s.n.,* Lt. Bryan's Expedition, South Fork of Platte, September, 1856, ♀ GH! MO!) as representing a variety of the species; one sheet was inscribed *A. Torreyi angustifolia,* but this name has not been published. Although Gray described the species as dioecious, the Bigelow and Parry specimens are not; Uline and Bray quite properly split them off as the types of a new monoecious species, *Amaranthus Bigelovii,* and a variety of the same, neither of which taxa concern us here. Only the Xantus collection belongs to the species now under consideration; the Engelmann collection belongs to the next species below. Uline and Bray effected a taxonomic separation of these two collections by splitting off a new variety under the misnomer *suffruticosus,* with the Xantus specimen as its type, thus leaving only the Engelmann collection in *A. Torreyi* proper. Unfortunately this procedure violated the rules, as Johnston has pointed out (1944, p. 155; 1948, p.

193), since the element best fitting the original description was removed from the species. Johnston has proposed that the name *A. Torreyi* be reinstated for the monoecious species which has generally been called *A. Bigelovii;* one alternative would be to reinstate the name *A. Torreyi* for the species now being considered. Neither of these alternatives provides a happy solution, since for fifty years the name *A. Torreyi* has been universally applied to the next species treated, which includes the Engelmann specimen. I believe the best escape from this miasma is by discarding the name *A. Torreyi* completely as a *nomen ambiguum,* potentially a source of continued confusion and error. The earliest available name for the present species then becomes *A. Watsoni* (syntypes: *Edward Palmer 312,* on a sand spit near Guaymas, Sonora, October, 1887, ♀ US!, here designated as lectotype; also ♂ ♀ in GH!; *Edward Palmer 675,* same area and year, ♂ US!; paratypes: *Edward Palmer 676,* same area and year, ♀ US!; *Nelson & Goldman 7282,* Santo Domingo to Matancito, Baja California, altitude 50 to 100 ft., November 14-15, 1905, ♂ US!; *Nelson & Goldman 7532,* La Paz, Baja California, altitude 0 to 20 ft., February 17, 1906, ♂ US!; and once again the well-worn *Xantus 100.*

Plants moderately stout, low and bushy, with many ascending branches, or erect, to 1 m. tall; leaf-blades ovate to oblong, often deeply retuse, sometimes coriaceous; two flowering and fruiting seasons: plants which grow with winter rainy season mature in spring, those which grow with summer rains mature in fall; thyrses often extremely thick, flexible or fairly rigid, usually 10 to 20 cm. long, either all terminal on leafy branches or a few loosely arranged leafless branch thyrses present, the uppermost of these not subtended by leaves; bract usually 2½ to 3½ mm. long, with distinctive glandular pubescence on outer side, the midrib excurrent, moderately heavy in ♂, heavy in ♀; ♂ flowers with 5 stamens, 5 tepals, the inner tepals 2½ to 3 mm. long, obtuse or emarginate, the outer tepals 3 to 3½ mm. long, acute, all tepals apiculate but dark midveins not excurrent; ♀ flowers with 5 strongly recurved approximately equal tepals, all tepals usually about 2½ mm. long, broadly spatulate and emarginate, with heavy, conspicuously branched, scarcely excurrent midveins; utricle about 1½ mm. long, circumscissile, thin, somewhat rugose; style branches usually 2, sometimes 3; seeds ¾ to 1¼ mm. in diameter, round or slightly obovate, lenticular, dark reddish brown.

The species is at home in coastal dunes, on beaches and sandspits, and other places near the sea. It is the most abundant annual on some of the low desert islands of the Gulf of California, growing on guano-impregnated and weakly saline flats (Johnston, 1924, p. 1018; also his notes on specimens in CAS, cited below). Inland, the species stays close to watercourses and is common on the sandy floors of ravines and arroyos. The Colorado River and the associated irrigation works have apparently provided the pathway by which this species, often mixed with *A. Palmeri,* has moved into southern California as a weed of irrigated fields and citrus groves.

Like *A. Palmeri,* with which it is probably confused in some of the ethnobotanical literature, this species has served as an Indian food plant. Eighteenth century accounts of the Indians of central Baja California report that bushels of seed from wild *bledos* were harvested in both spring and fall (Aschmann, 1953). The name, the region, and the kinds of sites mentioned all suggest that these plants were involved.

MEXICO. BAJA CALIFORNIA (1860). COMONDU: *T. S. Brandegee* UC, US; *T. Crocker* CAS; *Nelson & Goldman 7282* US; *C. R. Orcutt 32* US; *P. J. Rempel 135* ARIZ. ENSENADA: *Carter, Alexander, & Kellogg 1930* UC, *1931* UC; *I. M. Johnston 3527* CAS. LA PAZ: *T. S. Brandegee* UC; *A. Carter 2717* UC, *2727* UC; *I. M. Johnston 3032* CAS, *3225* CAS, GH, MO, UC, US; *M. E. Jones 24452* MO; *Nelson & Goldman 7532* US. MULEGÉ: *H. Aschmann* WIS; *H. S. Gentry 4065* MO, UC, *7831* UC, *7831A* UC; *I. M. Johnston 3652* CAS, *3743* CAS; *E. Palmer 147* CAS, GH, US; *I. L. Wiggins 7865* GH, MICH, UC, US. SAN JOSE DEL CABO: *T. S. Brandegee 492* UC, US; *L. J. Xantus 100* GH, US. TODOS SANTOS: *B. J. Hammerly 292* CAS, US.

SONORA (1887). CABORCA: *E. Palmer 958* GH, US. EMPALME: *T. D. Mallery* ARIZ. GUAYMAS: *H. S. Gentry 4686* ARIZ, CAS, MICH, MO, UC, US; *E. Palmer 311½* ARIZ, GH, US, *312* GH, US, *675* US, *676* US; *I. L. Wiggins 6356* MICH, POM, US, *6357* US.

UNITED STATES. ARIZONA (1912). YUMA: *J. J. Thornber* ARIZ.

CALIFORNIA (1901). IMPERIAL: *L. Abrams 3993* GH, MO, POM; *T. S. Brandegee* UC; *M. E. Jones* POM. LOS ANGELES: *L. C. Wheeler 963* POM, UC. RIVERSIDE: *T. S. Brandegee* UC; *J. D. Sauer 1667* WIS.

8. AMARANTHUS ARENICOLA I. M. Johnston, Jour. Arnold Arb. 29:193. 1948. *Amblogyne Torreyi* A. Gray, Proc. Am. Acad. 5:167. 1861 *(pro parte). Amaranthus Torreyi* (A. Gray) Benth. ex S. Wats. Bot. Calif. 2:42. 1880 (*pro parte*).

By a comedy of errors, presented briefly in the discussion of the preceding species, the name *A. Torreyi* has been incorrectly but almost universally applied to the present species. As a result this common and well-known species had no scientific name of its own until 1948, when Johnston named it *A. arenicola* (holotype: *A. S. Hitchcock 428A,* sandhills, Hamilton County, Kansas, 1895, ♀ GH!; isotypes: ♀ KSC! NMC! RM! US! ♂ MO!).

Plants stout and erect, commonly 2 m. tall; leaf-blade usually oblong; flowering and fruiting entirely in summer and fall, mostly July through September; thyrses often thick, flexible, usually 10 to 20 cm. long, either all terminal on leafy branches or, if a few leafless branch thyrses present, these loosely arranged and each subtended by a leaf; bract usually 1½ to 2½ mm. long, the midrib scarcely excurrent, heavy in ♂, extremely heavy in ♀; ♂ flowers with 5 stamens, 5 approximately equal tepals, the tepals usually about 3 mm. long, inner emarginate or obtuse, outer obtuse or acute, all apiculate but dark midveins not excurrent; ♀ flowers with 5 recurved spatulate tepals, each with conspicuous, usually branched midvein, the inner tepals 1½ to 2 mm. long, emarginate or obtuse, the outer tepals 2 to 2½ mm. long, obtuse, apiculate; utricle about 1½ mm. long,

circumscissile, thin, fairly smooth; style branches usually 3; seed 1 to 1¼ mm. in diameter, round, lenticular, dark reddish brown.

Johnston's name is well chosen; the plants seem to be very much at home in the sandhills. There and elsewhere the species is most abundant in such places as swales, dried ponds, lakeshores, river sandbars, edges of saline marshes, margins of hot springs. Most of the records are from sandy soil, but a few are from heavy silt or clay. The species is moderately successful as a weed. Almost half of the collections, including almost all those from isolated places outside the coherent range, were made in artificially disturbed habitats; fields, roadsides, railroad rights-of-way.

UNITED STATES. COLORADO (1861). Indefinite locality: *G. R. Kleeberger* CAS; *G. R. Vasey 509* CINC, GH, MO. Adams: *J. A. Ewan 13968* COLO, NO; *E. L. Johnston 275A* MO; *G. T. Robbins 853* UC. Baca: *Weber & Anderson 5190* COLO, UC. Boulder: *J. A. Ewan 12254* CAS, NO, UC; *W. A. Weber* COLO. Chaffee: *E. Harper 167* WIS. Clear Creek: *C. C. Parry 323* GH, MO. Denver: *A. Eastwood* COLO; *W. Heustis* COLO; *M. E. Jones 579* POM, UTC; *J. H. Smith 2038* US. El Paso: *R. Bacigalupi 904* GH, UC. Fremont: *T. S. Brandegee 477* MO, UC, US, *846* MO, UC; *G. Engelmann* MO; *G. Osterhout 3336* RM. Las Animas: *C. M. Rogers 5049* COLO, TEX, *5050* COLO, TEX. Lincoln: *E. O. Wooton* US. Logan: *G. E. Osterhout 1141* RM. Morgan: *G. Osterhout 7729* POM, RM; *F. Ramaley 16388* ARIZ, CAS, COLO, OKL, TEX, UC, UTC. Washington: *Ramaley & Ewan 16320* COLO. Weld: *J. Ewan 12291* NO, WIS, *13988* COLO, NO. *14098* COLO, NO; *E. L. Johnston 275* GH, US, *275B* GH, MO, US, *277A* US; *E. J. Kraus* WIS; *F. Ramaley 12368* COLO, *12386* COLO, *12560* (in part) COLO; *Ramaley & Ewan 16319A* NO; *L. F. Ward* US. Yuma: *Anonymous* MIN, MO, WIS; *G. E. Osterhout 4047* RM, WIS.

*DISTRICT OF COLUMBIA (1896). *E. S. Steele* MO.

*ILLINOIS (1898). Cook: *L. M. Umbach* WIS. Crawford: *H. E. Ahles 4963* ILL.

*INDIANA (1896). Lake: *W. S. Moffatt 493* ILL; *L. M. Umbach 388* TENN, *1419* WIS.

*IOWA (1895). Lee: *B. Shimek* TEX. Muscatine: *F. Reppert* IA.

KANSAS (1876). Indefinite locality: *A. S. Hitchcock 609* GH; *L. G. Hoysradt* US. Barton: *A. S. Hitchcock* KSC; *P. P. Lorimer* KSC. Cheyenne: *A. S. Hitchcock* KSC. Comanche: *A. S. Hitchcock* KSC. Dickinson: *A. S. Hitchcock* KSC. Edwards: *A. Finch* KSC; *A. S. Hitchcock* KSC. Ellsworth: *C. Weber 5* MO. Finney: *R. Fritz 45* KSC; *R. P. Murphy* KSC; *Rydberg & Imler 995* KSC; *E. O. Wooton* US. Ford: *F. C. Gates 15974* KSC. Grant: *A. S. Hitchcock* KSC. Gray: *A. S. Hitchcock* KSC. Hamilton: *A. S. Hitchcock 428A* GH, KSC, MO, NMC, RM, US. Haskell: *A. S. Hitchcock* KSC. Hodgeman: *A. S. Hitchcock* KSC. Kearny: *A. S. Hitchcock* KSC; *Rydberg & Imler 928* MO. Kiowa: *A. S. Hitchcock* KSC; *F. Rinkel* GH, DUKE, TEX, US. Meade: *A. S. Hitchcock* KSC. Morton: *Bloodhart & Poorman 9* KSC; *A. S. Hitchcock* KSC. Osborne: *C. L. Shear 180* MO, *211* (in part) GH, NEB, US, *213* GH, NEB, US. Pawnee: *A. S. Hitchcock* KSC. Pratt: *A. S. Hitchcock* KSC. Reno: *A. S. Hitchcock* KSC. Rooks: *E. Bartholomew* KSC, US. Seward: *W. A. Kellerman* KSC; *Rydberg & Imler 846* COLO, KSC, UC. Sheridan: *C. Weber 17* KSC. Stafford: *A. S. Hitchcock* KSC; *E. Maupin* KSC. Stanton: *A. S. Hitchcock* KSC. Stevens: *A. S. Hitchcock* KSC.

*MICHIGAN (1920). Lenawee: *C. Billington* US. Wayne: *O. A. Farwell 5149* US.

MISSOURI (1895). Jackson: *B. F. Bush 518* CAS, MIN, MO; *O. C. Durham 11232* ILL, MO.

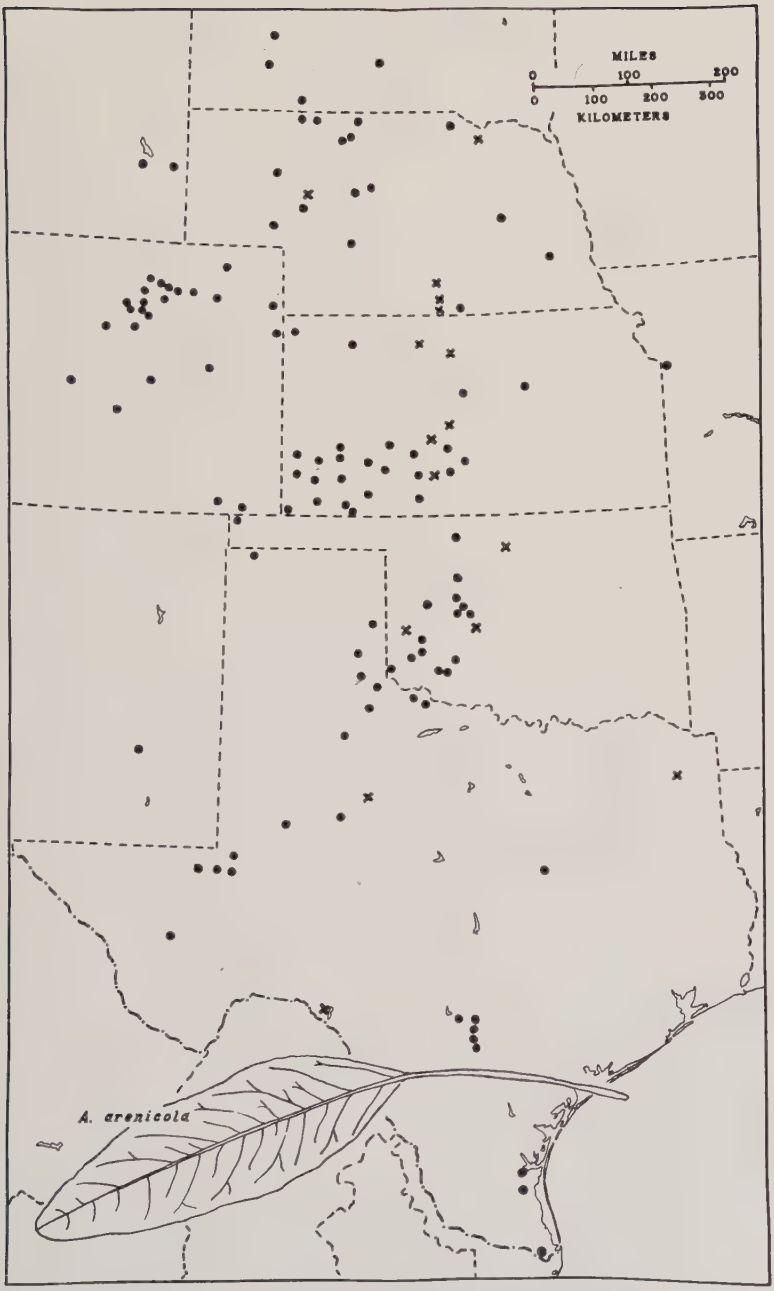

FIG. 10. *Amaranthus arenicola:* distribution map. Atypical plants indicated by crosses.

NEBRASKA (1856). Indefinite locality: *H. Engelmann* GH, MO; *F. V. Hayden* GH; *G. R. Vasey* US. ARTHUR: *W. Kiener 15417* GH. CHERRY: *E. Anderson* SDC, WIS; *J. M. Bates* GH, MIN, NEB, *5223* GH, MIN, NEB, *5315* NEB, *5323* MIN, NEB, *5334* NEB; *M. Dworak* NEB; *W. L. Tolstead 609* GH. FRANKLIN: *J. Ewan 14797* COLO, NO; *H. Hapeman* CM, UC; *J. D. Sauer 1683A* WIS. GARDEN: *C. H. Churchill* NEB; *H. Engelmann* MO. GRANT: *Rydberg & Tulen 1664* CU, *1674* (in part) SDC. HOLT: *Engelman, Hodges, & Nielsen 3486* MIN. KEARNEY: *H. Hapeman* NO, POM, RM. KNOX: *F. Clements 2755* (in part) CU, GH, MIN, US. LANCASTER: *J. L. Sheldon* WVA. LINCOLN: *W. Kiener 17310* GH; *J. D. Sauer 1691* WIS. PLATTE: *K. M. Wiegand 826* CU. SHERIDAN: *F. Sandoz 111* NEB, *112* NEB, *113* NEB, *114* NEB. THOMAS: *J. C. Blumer* ISC; *Pool & Folsom* NEB; *Pool & Williams* NEB; *Rydberg & Tulen 1370* NEB, SDC, *1513* NEB, US. WEBSTER: *J. M. Bates* NEB.

*NEW JERSEY (1930). BURLINGTON: *W. H. Witte* RM. CAMDEN: *W. H. Witte* ARIZ. GLOUCESTER: *S. F. Blake 11260* GH, US.

NEW MEXICO (1903). CHAVES: *D. Griffiths 5702* US.

OKLAHOMA (1853). Indefinite locality: *G. W. Stevens 804* OKL. BECKHAM: *B. Osborn 1348R* OKL. BLAINE: *G. W. Stevens 857½* GH, OKL. CADDO: *J. M. Bigelow* US; *M. Hopkins 2132* OKL. CIMARRON: *D. Demaree 13306* GH, MIN, OKL. COMANCHE: *F. B. McMurry 529* OKL. CUSTER: *L. Mericle 408* OKL, *720* OKL, *949* OKL, *1032* OKL; *G. W. Stevens 916* GH, OKL. GARFIELD: *H. B. Gephardt 563* US. GREER: *R. Bull 221* OKL; *G. W. Stevens 1039* GH, ILL, MIN, MO, OKL, US. HARMON: *M. Hopkins 1071* OKL, *1072* OKL. KIOWA: *M. Hopkins 854* OKL; *G. W. Stevens 1190* GH, MIN, OKL. WASHITA: *C. T. Eskew 1498* OKL. WOODS: *G. W. Stevens 1702* GH, ILL, MIN, MO, OKL, US.

*PENNSYLVANIA (1941). DELAWARE: *L. C. Wheeler 5563* GH.

SOUTH DAKOTA (1889). BENNETT: *J. W. Moore 843* MIN. LYMAN: *T. A. Williams 143* CAS. PENNINGTON: *W. H. Over 2384* US. WASHINGTON: *W. H. Over 2410* US.

TEXAS (1859). Indefinite locality: *V. Havard* US; *G. C. Neally* GH, US; *J. Reverchon* MO. ATASCOSA: *V. L. Cory 11677* GH, *19152* GH. BEXAR: *B. Mackensen 219* MO; *H. B. Parks 27084* GH. CAMERON: *I. Shiller 915* TEX. CHILDRESS: *Anonymous* TEX. COLLINGSWORTH: *V. L. Cory 16127* GH. COTTLE: *V. L. Cory 35272* GH. DALLAM: *V. L. Cory 35418* GH. DICKENS: *V. L. Cory 16004* GH. FISHER: *E. Whitehouse 16737* MIN, SMU. HALL: *J. Reverchon* MO; *E. Whitehouse 10743* SMU, UC. HARDEMAN: *C. R. Ball 965* US. JEFF DAVIS: *V. L. Cory 40520* GH. KENEDY: *V. L. Cory 17036* GH; *R. Runyon 2847* US, *3582* US; *L. H. Shinners 17803* SMU. *17090* SMU. LOVING: *B. H. Warnock 10693* SMU. MARTIN: *V. L. Cory 40947* TEX. MCLENNAN: *L. D. Smith 1045* TEX. MEDINA: *E. Palmer 1131* GH, MO, US. MITCHELL: *R. W. Pohl 4328* ISC, SMU. MORRIS: *V. L. Cory 56912* SMU. VAL VERDE: *Parry & Bigelow 1195* US; *L. H. Shinners 17347* SMU. WARD: *B. C. Tharp 3389* (in part) TEX, US; *Turner & Warnock 60* SMU, SRSC; *B. H. Warnock 9029* SRSC, *9036* SMU, SRSC; *Warnock & Parks 8823* SRSC. WHEELER: *V. L. Cory 35311* GH. WILBARGER: *E. Eggert* MO, WIS. WINKLER: *L. C. Hinckley 4518* SRSC.

*VIRGINIA (1939). DINWIDDIE: *Fernald & Long 10633* CU, DUKE, GH, MO, US.

WYOMING (1889). GOSHEN: *Brenckle & Stevens 39022* NDA. PLATTE: *A. Nelson 8581* CU, MO. *SWEETWATER: *W. Cleburne* NEB.

9. AMARANTHUS GREGGII S. Wats. Proc. Am. Acad. 12:274. 1877. *Amaranthus Greggii* S. Wats. var. *Muelleri* Uline & Bray, Bot. Gaz. 19:272. 1894. *Amaranthus myrianthus* Standl. Bull. Torrey Club 41:506. 1914. *Amaranthus annectens* Blake, Jour. Bot. 53:103. 1915.

Watson described this species from a single collection, entirely of pistillate plants (*J. Gregg s.n.,* frequent near the mouth of the Rio Grande,

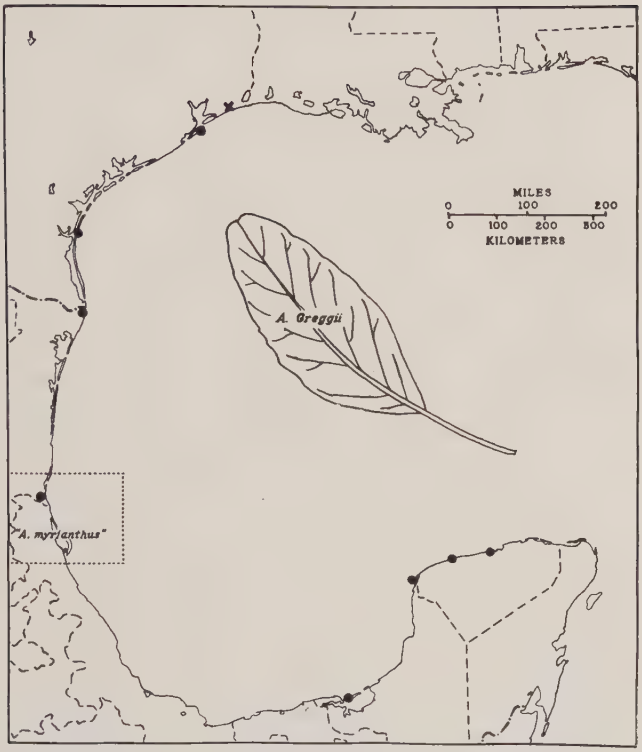

FIG. 11. *Amaranthus Greggii:* distribution map. Atypical plants indicated by crosses.

Tamaulipas, December 17, 1847, GH!, here designated as lectotype; also MO!). Uline and Bray knew but one additional collection, also pistillate (*F. Mueller s.n.,* near Vera Cruz, 1853), from which they described a new variety. They mentioned no concrete differences between the species proper and the variety and added the curious statement that the two are "inseparable." Standley described *A. myrianthus* to include this variety but based it on a different type (holotype: *Edward Palmer 266,* sea level, vicinity of La Barra, 8 km. east of Tampico, Tamaulipas, February 1–8, 1910, ♀ US!; isotypes: ♀ GH! MO! US! WIS!). The proper taxonomic disposition of this collection and one similar to it (*Edward Palmer 511,* same area and year) is not easy to determine. The living plants were badly injured by insects and had become half monstrous, with larvae instead of seeds in most of the utricles. These miserable plants appear to be morphologically intermediate between *A. Greggii* and *A. arenicola,* and are conceivably hybrids between those species. Blake described his species from a single collection (holotype: *A. Schott 360,* seashore, Celestun, Yucatan, May 12, 1868, ♀ BM, fragment US!; isotype: ♂ ♀ GH!), which shows some quantitative differences from the type of *A. Greggii.*

However, when all available specimens are assembled, there is no apparent discontinuity between the two forms.

Plants stout, sprawling or erect, to 1 m. tall; leaf-blade strikingly thick and coriaceous with prominent nerves beneath, usually oblong but quite variable in shape; flowering and fruiting during summer and fall in northern colonies, during all seasons in tropics; thyrses thick, flexible, 5 to 15 cm. long, either all terminal on leafy branches or, if a few leafless branch thyrses present, each subtended by a leaf; bract 1½ to 2½ mm. long, the midrib scarcely excurrent, heavy in ♂, very heavy in ♀; ♂ flowers with 5 stamens, 5 approximately equal tepals, the tepals usually 2½ to 3 mm. long, the inner emarginate or obtuse, outer obtuse or acute, all apiculate but dark midveins not excurrent; ♀ flowers with 5 recurved, approximately equal tepals which are usually 2½ to 3 mm. long, the inner spatulate and emarginate, the outer obovate-oblong and obtuse, all with heavy, conspicuously branched, scarcely excurrent midveins; utricle about 3 mm. long, indehiscent, somewhat fleshy, fairly smooth; style branches usually 3; seed 1¼ to 1¾ mm. long, obovoid, lenticular, dark brown.

The dozen collections with habitat data are all from coastal sand dunes or from sea beaches.

MEXICO. CAMPECHE (1933). Carmen: *C. D. Mell 2015* US.

TAMAULIPAS (1847). Matamoros: *J. Gregg* GH, MO; *R. Runyon 475* US. Tampico: *E. Palmer 266* GH, MO, US, WIS, *511* GH, MO, US.

YUCATAN (1868). Celestun: *A. Schott 360* GH, US. Dzilam Gonzalez: *G. F. Gaumer 1243* GH, MO, US. Progreso: *R. L. Crockett 69* US; *Lundell* & *Lundell 8061* US; *W. C. Steere 3112* MICH.

UNITED STATES. TEXAS (1902). Galveston: *G. L. Fisher 102* MO, MT, US, *303* US, *605* GH, MT, RM, US, *612* GH, US; *F. C. Gates 19217* KSC; *L. H. Pammel* ISC; *J. Reverchon 2940* MIN, MO. WIS. Jefferson: *B. C. Tharp 3131* US. Kleberg: *B. C. Tharp* TEX.

10. **Amaranthus Acanthochiton** (Torr.) stat. nov. *Acanthochiton Wrightii* Torr. in Sitgr. Rep. Exp. 170. 1853. Non *Amaranthus Wrightii* S. Wats. Proc. Am. Acad. 12:275. 1877.

The monotypic genus *Acanthochiton* was described from two early collections (syntypes: *S. W. Woodhouse s.n.,* Sitgreaves expedition, Zuñi Pueblo, September, 1851, ♂ ♀ GH!, the ♀ here designated as lectotype; *C. Wright 1167,* Rio Grande Valley, about 50 miles below El Paso, September 6, 1849, ♀ GH! US!). Since the epithet *Wrightii* cannot be retained when this taxon is assigned to *Amaranthus,* another name must be chosen. To maintain a continuity in names, *Acanthochiton* is herein given specific rank.

Plants stout and erect, usually about ½ m. tall, with many ascending branches; leaf-blade narrowly lanceolate to linear, the nerves prominent beneath, the margin crispate; flowering and fruiting entirely in summer and fall, mainly August through November; thyrses rather thick and stiff,

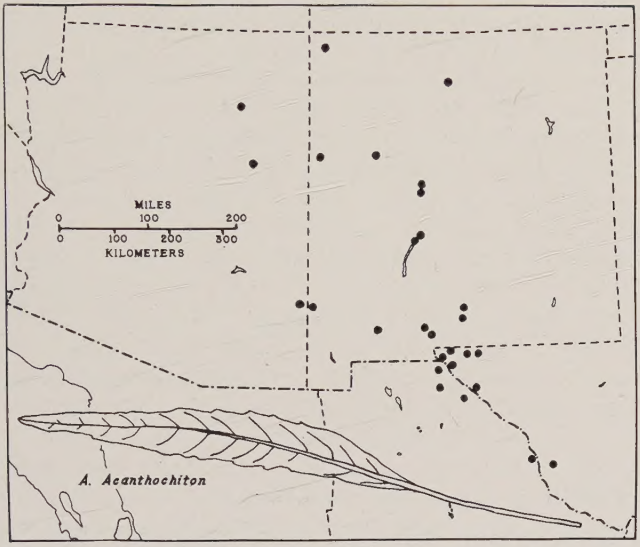

FIG. 12. *Amaranthus Acanthochiton:* distribution map.

usually less than 10 cm. long, entirely terminal on leafy branches; bracts dimorphic, those on ♂ plants with the ordinary lanceolate form common to most of the genus, 2 to 3 mm. long, with moderately heavy, excurrent midribs, those on ♀ plants 5 mm. long or more, recurved, the excurrent midribs extremely heavy, the laminae accrescent, finally enfolding the flower, indurated, with prominent reticulate venation and crenate margins; ♂ flowers with 5 stamens, 5 tepals, the inner tepals 2½ to 3½ mm. long, emarginate, the outer 3 to 4 mm. long, acute, all apiculate but dark midveins not excurrent; ♀ flowers usually with 5 tepals, the inner rudimentary, less than 1 mm. long, linear, the outer well-developed, sometimes 4 or 5 mm. long, broadly spatulate, with crenate margins and conspicuous branching venation; utricle about 2 mm. long, circumscissile, thin, somewhat rugose; style branches usually 3; seed 1 to 1¼ mm. in diameter, obovate, lenticular, dark reddish brown.

The species is at home on sand dunes, sandy riverbanks, and sandy places in general. The distribution may have been modified by Indian gathering of the plants for food. Cooked as greens, the plants have been an important food of such people as the Hopi since ancient times (Hough, 1898, p. 142).

MEXICO. CHIHUAHUA (1852). JUAREZ: *H. LeSueur 177* TEX, *278* GH, MO, SMU, TEX, *280* GH, TEX; *C. G. Pringle 796* CM, GH, MIN, MO, MSC, UC, US, WIS. OJINAGA: *F. Shreve 9033* ARIZ, GH, MICH, UC. PRAXEDIS GUERRERO: *G. Thurber 806* GH, *809* GH.

UNITED STATES. ARIZONA (1896). GREENLEE: *A. Davidson 1081* GH. NAVAJO: *W. Hough 60* US; *A. F. Whiting* FLAG; *M. Zuck* UC, US.

NEW MEXICO (1846). DONA ANA: *F. R. Fosberg S3410* CAS, GH, POM, UC; *G. R. Vasey* US; *E. O. Wooton* ARIZ, COLO, NMC, OC, POM, RM, UC, US, *24* GH, MIN, MO, NMC, POM, RM, UC, US; *Wooton & Standley 3156* IND, MIN, NMC, RM, US, WIS. HIDALGO: *E. L. Greene 272* GH, MO, POM. LUNA: *D. Griffiths 3330* US, *3333A* US; *M. E. Jones* CAS, GH, MO, POM, RM, UC, US, UTC; *A. I. Mulford 1030* ILL. OTERO: *F. S. Earle 416* US; *B. Shimek* IA. MCKINLEY: *S. W. Woodhouse* GH. RIO ARRIBA: *E. O. Wooton 2722* US. SAN JUAN: *P. C. Standley 7887* US. SOCORRO: *C. L. Herrick 840* US; *A. Wislizenus 56* MO; *E. O. Wooton* NMC. VALENCIA: *E. F. Castetter 1312* RM; *H. H. Rusby 365½* CU.

TEXAS (1849). Indefinite locality: *C. C. Parry* MO. EL PASO: *V. L. Cory 30990* GH; *D. B. Dunn 8791* CAS, DUKE, MT. NMC, TENN, WIS; *V. Havard 49* GH; *E. Stearns 436* US; *B. C. Tharp* MICH; *B. H. Warnock 8244* SRSC, *8245* SMU, SRSC; *E. Whitehouse* TEX. HUDSPETH: *U. T. Waterfall 6575* GH, MO, SMU; *C. Wright 1167* GH, US. PRESIDIO: *J. M. Bigelow 1186* US.

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THE STATUS OF PSEUDOHOMALOMENA PASTOENSIS

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Pseudohomalomena pastoensis was described by A. D. Hawkes as a new genus and new species of the Araceae (Madroño 11:146-149. 1951). The author placed it in the subfamily Philodendroideae, tribe Philodendreae, subtribe Homalomeninae, with the statement that because of "its widely-spreading, almost flattened, large spathe" it "is virtually unique in the subtribe."

A comparison of the type specimen (*Espinosa 2866,* Pasto, "Ecuador," UC 905798) with a photograph of the type specimen of *Zantedeschia* (*Calla*) *aethiopica* (No. 1081–1 in the Herbarium of the Linnean Society of London) indicates that the two are conspecific. Engler (1915) placed the genus *Zantedeschia* in the tribe Zantedeschieae of the subfamily Philodendroideae.

In the description of *Pseudohomalomena pastoensis* certain statements are made concerning the habit of the plant that are not supported either by an examination of the specimen or by the collector's notes. It is described as "terrestrial" and "apparently stemless"; however, with the meagre material available one could as well assume that it was epiphytic and scandent. Likewise, the lamina is described as hastate with a caudate apex; actually the lamina of the type specimen is sagittate with a cuspidate apex.

The specimen appears to have the petiole and peduncle cut short; yet the measurements of the remaining parts were taken without qualification as to the probable missing parts. It is indicated in the Latin generic diagnosis that the petiole is lightly vaginate, but this statement could not be derived from the cited specimen, as only a small part of the upper portion remains on the specimen and close observation reveals no vagination of any degree on this part. The presence of vagination is of importance inasmuch as the subtribe Homalomeninae, in which the author placed *Pseudohomalomena,* is defined by Engler and Krause (1912, p. 24) as having a vaginate petiole.

In translating from the collector's notes, an error has been made concerning the color of the spathe. "Color amarillo muy ckaro [claro], casi blanco" is translated as "bright yellow, almost white." More properly the phrase should be translated as color yellow, very light, almost white. This is in accordance with the spathe coloration that occurs in *Zantedeschia aethiopica* for the spathe often becomes cream color in age.

The type locality, Pasto, was given in the article as being in Ecuador; although it is close to the border of that country, it is within Colombia. The collector's notes clearly indicate that the plant was not native to Pasto for they read, "cultivado o semiespontanea," but this fact is not mentioned in the article. There are numerous instances of localities where this

plant has escaped from cultivation, for example: in Marin County, California (Howell, 1949, p. 97) and in Costa Rica (Standley, 1937, p. 146).

It is, therefore, concluded from this study that *Pseudohomalomena pastoensis* A. D. Hawkes is a synonym of *Zantedeschia aethiopica* (L.) Spreng., the common White Calla Lily, a native of South Africa.

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REVIEW

How to Know the Grasses. By Richard W. Pohl. 192 pp., 1954. Wm. C. Brown Company, Dubuque, Iowa. Spiral binding, $2.00; cloth binding, $2.75.

This most recent addition to the "Pictured-Key Nature Series" treats 293 of "... the commonest and most important species of American grasses — those that the beginner is most apt to meet, and those of importance in farming, gardening, weed control, range and pasture management. In addition to those keyed and illustrated, 91 others are mentioned in connection with closely related species, and their distinguishing features are pointed out."

The book has a most helpful introductory section which points out (in a compact, illustrated key) the differences between the Juncaceae, Gramineae, and Cyperaceae and which also functions as an illustrated glossary for the more common terms the student must know to begin a study of the grasses. This introductory section is made more complete by the inclusion of a brief bibliography of useful books on grasses, several pages of directions for the collection and study of these plants, and a well illustrated key to the tribes of this family.

The pictured keys to the species seem to be workable and well constructed. However, the somewhat arbitrary selection of species necessitated by the geographic scope of the book may sometimes limit accurate field use of the book for identification to the species level.

For example: *Andropogon elliottii,* found in southern Illinois, would key to *A. virginicus;* and a student, not knowing the frequency of occurrence of *A. elliottii* and possibly not heeding the author's note that "about fourteen other similar species or varieties occur in the southeastern states," might assume his work to be completed correctly. For the beginning student, however, such a mistake would probably be of no great consequence.

The many grasses which are "common locally" throughout the United States could obviously not be included in this beginner's book, and for this reason its greatest value, other than the text value of the introduction, will be in supervised field work and in class use to key out selected grasses. Within this scope, its content, size, and price should make it a popular member of the series and useful in a wide geographical area.—C. Ritchie Bell, Department of Botany, University of Illinois, Urbana.